Public Works and Government Services Canada

Requisition No. EZ899-161853/A

DRAWINGS & SPECIFICATIONS
for
H.V. UPGRADE (PHASE 1 OF 2)
WILLIAM HEAD INSTITUTION - BUILDING 106
Project No.: R.069376.001

APPROVED BY:

Regional Manager, AES — Date: Nov. 20/15

Construction Safety Coordinator — Date: 2015/11/16

TENDER:

Project Manager — Date: Nov. 16/15

Real Property Services Branch, Professional and Technical Services, Pacific Region
Room 219 - 800 Burrard Street, Vancouver, B.C. V6Z 0B9

CONSULTANTS – SEAL & SIGNATURE

Discipline	**Seal / Signature / Date**
Electrical (Prime)	 NOV.16.2015

END OF SECTION

END OF INDEX

DRAWING NO.	DRAWING TITLE
Bound Separately	
E-000	Site plan, symbol legend, and electrical details
E-001	Single line diagram and details
E-100	Electrical floor plan and electrical details
E-200	Existing WHI Single Line Diagram
E-201	Temporary Power Supply Details

END OF INDEX

	TITLE	
APPENDIX A	Hazardous Materials Survey – Administration Building, William Head Institution, Correctional Services Canada, Victoria, British Columbia	**79**

END OF INDEX

Total Pages **239**

PART 1 GENERAL

1.1 SUMMARY OF WORK

.1 Work covered by Contract Documents:

.1 Work of this Contract comprises general construction requiring demolition, renovation and construction to provide electrical upgrades at Building 106 located at William Head Institution (Metchosin, BC). This Work is the first of two phases of a larger scope of work to replace the high voltage site distribution to improve fault current and arc flash levels throughout the site.

2. There will be another contractor on site, working in parallel, to perform electrical works in Building 106. Refer to the electrical drawings for their scope. Perform role of Prime Contractor and be responsible for the health and safety program (per WorkSafe BC) of the construction site for work while these other contractors/trades are working on site.

.2 Work to be performed under this Contract includes, but not limited to, the following items covered further in the Contract documents:

.1 Provide a detailed work plan including a project schedule and phasing. This detailed work plan shall be submitted to the Departmental Representative for review to verify that there will be no interruption of service.

.2 Do not start work until all essential equipment is delivered to the site and the work can proceed without delays.

.3 Provide as-built drawings and closeout submittals.

.4 Improve the existing bottleneck in the site distribution to allow the Institution to de-energize power to Building 106 without having to interrupt the site service by providing a new pad-mount primary 4-way switch.

.5 Replace the existing indoor unit substation with a new outdoor pad-mount transformer.

.6 Provide temporary generation to supply power to the site downstream of Building 106 to bridge interruption in site service.

.7 Provide a new secondary distribution centre in the electrical room of Building 106.

.8 Replace existing Panel 'A' in the electrical room with a new panel.

.9 Tie in existing panels and circuits to new secondary distribution centre.

.10 Provide fire alarm verification.

.11 Provide selectively coordinated devices coordinated with upstream protective

devices.

.12 Provide approved commissioning agent to commission new system in accordance with NETA standards.

.3 Contractor's Use of Premises:

.1 Contractor has limited use of site for work of this contract until Substantial Completion:

.1 Contractor use of premises for storage and access, as approved by the Departmental representative.

.2 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.2 Vehicular access through the Sally Port will be restricted during the inmate "count" at breakfast, lunch and dinner hours. Confirm times with Departmental Representative. Delays may occur when entering and exiting the Institution with vehicles due to security situations and heavy traffic.

1.2 WORK RESTRICTIONS

.1 Notify Departmental Representative of intended interruption of power, communication and water services and provide schedule of interruption times.

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of services throughout course of work. Keep duration of interruptions to a minimum. Coordinate interruptions with local authority having jurisdiction and local residences and businesses affected by the disruption.

.3 Provide for access by pedestrian and vehicular traffic on and around site where work is in progress.

.4 Construct barriers in accordance with Section Temporary Barriers and Enclosures.

.5 Security Requirements: refer to Section 01 14 10 - Security Requirements.

.6 Hours of work:

.1 Perform work during normal working hours of the Institution 0730 to 1600, Monday through Friday except holidays.

.2 When it is necessary, arrange in advance with Departmental Representative to work outside of normal working hours.

1.3 CONSTRUCTION WORK SCHEDULE

.1 Commence work immediately upon official notification of acceptance of offer and complete the work within 24 weeks from the date of such notification.

.2 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Substantial Certificate and Final Certificate as defined times of completion are of essence of this contract.

.3 Coordinate schedule of work within Building 106 electrical room with Prime Contractor for other scope of work. Adjust timing as required.

.3 Submittal:

.1 Submit to Departmental Representative within 10 working days of Award of Contract, a Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of construction progress.

.2 Identify each trade or operation.

.3 Show dates for delivery of items requiring long lead time.

.4 Departmental Representative will review schedule and return one copy.

.5 Re-submit two (2) copies of finalized schedule to Departmental Representative within five (5) working days after return of reviewed preliminary copy.

.4 Project Scheduling Reporting:

.1 Update Project Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

.5 Project Meetings:

.1 Discuss Project Schedule at bi-weekly site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed and negotiated.

.3 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Departmental Representative and aggregating contract price. After approval by Departmental Representative cost breakdown will be used as basis for progress payments. Only PWGSC paper work is acceptable.

1.4 SITE ACCESS AND CONTRACTOR LAYDOWN AREA

.1 The work of this contract is within the secure perimeter of the existing institution. All access will be through the existing Principle Entrance of the Institution.

.1 Reference Section 01 14 10 Security Requirements.

.2 PWGSC has designated a Contractor Laydown area for this project. The contractor will be required to use this area only for construction operations. Note obtain and follow all rules and regulations.

.1 Reference Section 01 14 10 Security Requirements.

.3 Material and equipment deliveries must be through the Principle Entrance of the Institution.

.4 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.5 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

.6 Refer to Section 01 14 10 for special security requirements.

1.4 RESPONSIBILITIES

.1 Departmental Representative Responsibilities:

.1 No additional responsibilities except as described in the specifications.

.2 Contractor Responsibilities:

.1 Designate submittals and delivery date for each product in progress schedule.

.2 Review shop drawings, product data, samples, and other submittals. Submit to departmental representative notification of any observed discrepancies or problems anticipated due to non-conformance with contract documents.

.3 Receive and unload products at site.

.4 Inspect deliveries jointly with departmental representative; record shortages, and damaged or defective items.

.5 Handle products at site, including uncrating and storage.

.6 Protect products from damage, and from exposure to elements.

.7 Assemble, install, connect, adjust, and finish products.

.8 Provide installation inspections required by public authorities.

.9 Repair or replace items damaged by contractor or subcontractor on site under his control.

.10 Take meeting minutes at project meetings.

1.5 SUBMITTAL PROCEDURES

.1 Administrative:

.1 Submit to Departmental Representative submittal listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Work affected by submittal shall not proceed until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittal prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittal not stamped, signed, dated and identified as to specific project will be returned without being examined and shall be considered rejected.

.6 Notify Departmental Representative in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are coordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative review of submittal.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

.2 Shop Drawings:

.1 Drawings to be originals prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate appropriate portion of work; showing fabrication, layout, setting or erection details as specified in appropriate sections.

.3 Product Data:

.1 Certain specification Sections specify that manufacturer's standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and other standard descriptive data will be accepted in lieu of shop drawings, provided that the product concerned is clearly identified. Submit in sets, not as individual submissions.

.4 Samples:

.1 Submit samples in sizes and quantities specified.

.2 Where colour is criterion, submit full range of colours.

.3 Submit all samples as soon as possible after the contract is awarded, to facilitate production of complete colour scheme by the Departmental Representative.

.5 Mock-ups:

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

.2 Construct in location as specified in specific Section.

.3 Prepare mock-ups for Departmental Representative' review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

.6 Progress Photographs:

.1 Provide construction photographs in accordance with procedures and submission requirements specified in this clause.

.2 Progress Photographs:

.1 Provide digital photographs with images of minimum 3.1 mega pixel resolution and stored in Jpeg format with minimal compression.

.2 Number of viewpoints: four (4), locations of viewpoints directed by Departmental Representative.

.3 Frequency: monthly, submitted on disk with monthly progress statement, sent via e-mail or as directed by Departmental Representative.

.4 Identify photos by location, date and sequential numbering system.

.3 Final Photographs:

.1 Provide digital photographs with images of minimum 3.1 mega pixel resolution and stored in Jpeg format with minimal compression. Where photos are e-mailed compression can be increased.

.2 Number of viewpoints:

.1 Each side of building for a total of 4.

.2 Interior of rooms and finishes for a total of 8.

.3 Locations of viewpoints determined by Departmental Representative.

.3 Submit final photographs in digital format on CD, before final acceptance of building.

.4 Label disks and identify with name and project number of project. Indicate exposure dates and viewpoints of each photo and photo number.

.7 Submission Requirements:

.1 Schedule submissions at least ten days before dates reviewed submissions will be needed.

.2 Submit number of copies of product data, shop drawings which Contractor requires for distribution plus four (4) copies which will be retained by Departmental Representative.

.3 Accompany submissions with transmittal letter in duplicate.

.4 Submit bond copies (hard copy) as directed by Departmental Representative.

.8 Coordination of Submissions:

.1 Review shop drawings, product data and samples prior to submission.

.2 Coordinate with field construction criteria.

.3 Verify catalogue numbers and similar data.

.4 Coordinate each submittal with requirements of the work of all trades and contract documents.

.5 Responsibility for errors and omissions in submittal is not relieved by Departmental Representative's review of submittal.

.6 Responsibility for deviations in submittal from requirements of Contract documents is not relieved by Departmental Representative's review of submittal, unless Departmental Representative gives written acceptance of specified deviations.

.7 Notify Departmental Representative, in writing, at time of submission, of deviations in submittal from requirements of Contract documents.

.8 Make any changes in submissions which Departmental Representative may require consistent with Contract Documents and re-submit as directed by Departmental Representative.

.9 After Departmental Representative's review, distribute copies.

.10 Shop Drawings Review:

.1 Review of shop drawings by Public Works and Government Services Canada (PWGSC) is for the sole purpose of ascertaining conformance with the general concept.

.2 The Departmental Representative's review does not mean that PWGSC approves the detail design inherent in the shop drawings, responsibility remains with the contractor submitting same, and such review will not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and contract documents.

.3 Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for co-ordination of the work of all subtrades.

1.6 HEALTH AND SAFETY

.1 Specified in Section 01 35 33.

1.7 ENVIRONMENTAL PROCEDURES

.1 Fires and burning of rubbish on site not permitted.

.2 Do not bury rubbish and waste materials on site unless approved by Departmental Representative.

.3 Do not dispose of waste or volatile materials such as oil, paint thinner or mineral spirits into waterways, storm or sanitary systems.

.4 Provide temporary drainage and pumping as necessary to keep excavations and site free from water during excavation and grading activities.

.5 Control disposal of run-off of water containing suspended materials or other harmful substances in accordance with local authority requirements. Construct settlement ponds and silt fences as required by the Provincial Environmental authority.

.6 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.

.7 Under no circumstances dispose of rubbish or waste materials on adjoining property.

1.8 REGULATORY REQUIREMENTS

.1 References and Codes:

.1 Perform Work in accordance with National Building Code of Canada (NBCC2010) and where applicable British Columbia Building Code (BCBC2012) including all amendments up to bid closing date and other codes of

provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.9 QUALITY CONTROL

.1 Inspection:

.1 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

.2 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.3 Departmental Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

.2 Procedures:

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

.3 Rejected Work:

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.4 Reports:

.1 Submit (4) four copies of inspection and test reports to Departmental Representative.

.5 Tests and Mix Designs:

.1 Furnish test results and mix designs as may be requested.

.6 Mock-ups:

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

.2 Construct in locations acceptable to Departmental Representative and as specified in specific Section.

.3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 If requested, Departmental Representative will assist in preparing a schedule fixing dates for preparation.

.6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

.7 Mill Tests:

.1 Submit mill test certificates as requested and as required of specification Sections.

.8 Equipment and Systems:

.1 Submit adjustment and balancing reports for electrical equipment systems.

.2 Refer to specific Section for definitive requirements.

1.10 TEMPORARY UTILITIES

.1 Installation and Removal:

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

.2 Dewatering:

.1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

.3 Water Supply:

.1 Arrange, pay for and maintain temporary water supply in accordance with local authority, governing regulations and ordinances.

.2 Permanent water supply system installed under this contract may be used for construction requirements provided that guarantees are not affected thereby. Replace damaged components.

.4 Temporary Power and Light:

.1 Arrange, pay for and maintain temporary electric power supply in accordance with local power authority governing regulations and ordinances.

.2 Electrical power and lighting installed under this contract may be used for construction purposes at no extra cost, provided that guarantees are not affected thereby and electrical components used for temporary power are replaced when damaged.

.3 Replace lighting bulbs/tubes and clean reflectors and lenses used for more than three months.

.5 Temporary Communication Facilities:

.1 Provide and pay for temporary telephone and fax hook up, line(s) necessary for own use.

.6 Fire Protection:

.1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

1.11 CONSTRUCTION FACILITIES

.1 Installation and Removal:

.1 Provide construction facilities in order to execute work expeditiously.

.2 Remove from site all such work after use.

.2 Scaffolding:

.1 Design, construct and maintain scaffolding in rigid, secure and safe manner, in accordance with WorkSafe BC regulations and Section 01 35 33.

.2 Erect scaffolding independent of walls. Remove promptly when no longer required.

.3 Hoisting:

.1 Provide, operate and maintain hoists required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

.2 Hoists to be operated by qualified operator.

.4 Site Storage/Loading:

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

.5 Construction Parking:

.1 Make good damage to existing roads used for access to project site.

.2 Build and maintain temporary access where required and provide snow removal during period of Work.

.3 Park vehicles outside perimeter fence in designated parking areas.

.6 Contractor's Site Office and enclosure:

.1 Provide office of size to accommodate site meetings and Contractor's operations.

.2 Provide a clearly marked and fully stocked first-aid case in a readily available location.

.3 Provide temporary fenced area to enclose site and operations.

.7 Equipment, Tools and Material Storage:

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

.8 Sanitary Facilities:

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures. Permanent facilities may be used on approval of Departmental Representative.

1.12 TEMPORARY BARRIERS AND ENCLOSURES

.1 Hoarding:

.1 Erect temporary site enclosure using new 1.8 m high temporary construction fencing. Provide lockable truck gate. Maintain fence in good repair.

.2 Enclosure of Structure:

.1 Provide temporary weathertight enclosures and protection for exterior openings until permanently enclosed. Design enclosures to withstand wind pressure. Provide lockable entry as required for moving personnel equipment and materials.

.2 Provide temporary enclosures to secure building from entry of unauthorized personnel during construction period.

.3 Guardrails and Excavations:

.1 Provide secure, rigid guard rails and barricades around deep excavations, open edges of floors and roofs etc.

.2 Provide as required by governing authorities.

.4 Access to Site:

.1 Maintain immediate local access roads in clean condition used during work of this contract.

.5 Protection for Off-Site and CSC Property:

.1 Protect surrounding CSC property from damage during performance of Work.

.2 Be responsible for damage incurred.

.6 Protection of Building Finishes:

.1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.

.2 Provide necessary screens, covers, and hoardings.

.3 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.

.4 Be responsible for damage incurred due to lack of or improper protection.

1.13 COMMON PRODUCT REQUIREMENTS

.1 Reference Standards:

.1 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.2 Cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-

conformance.

.3 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

.2 Quality:

.1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

.3 Storage, Handling and Protection:

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative .

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

.4 Transportation:

.1 Pay costs of transportation of products required in performance of Work.

.2 Transportation cost of products supplied by Departmental Representative will be paid for by Departmental Representative. Unload, handle and store such products.

.5 Manufacturer's Instructions:

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

.6 Quality of Work:

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

.7 Co-ordination:

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

8 Concealment:

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

.9 Remedial Work:

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner neither to damage nor to put at risk any portion of Work.

.10 Location of Fixtures:

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Departmental Representative of conflicting installation. Install as directed.

.3 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

.11 Fastenings:

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

.12 Fastenings - Equipment:

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

.13 Protection of Work in Progress:

.1 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

.14 Existing Utilities:

.1 Where work involves breaking into or connecting to existing services, carry out work at times directed by governing authorities, with minimum of disturbance to pedestrian and vehicular traffic.

.2 Before commencing work, establish location and extent of service lines in areas of work and notify Departmental Representative of findings.

.3 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility. Adhere to approved schedule and provide notice to affected parties.

.4 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.5 Record locations of maintained, capped and re-routed services lines.

.15 Contractors Options for Selection of Products:

.1 Products specified by **"Prescriptive" specifications**: select any product meeting or exceeding specifications.

.2 Products specified under "**Acceptable Products**" (used for complex Mechanical or Electrical Systems): select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding the Prescriptive specifications and indicated Products.

.3 Products specified by performance and referenced standard: select any product meeting or exceeding the referenced standard.

.4 Products specified to meet particular design requirements or to match existing materials: use only material specified Approved Product. Alternative products may be considered provided full technical data is received in writing by Departmental Representative in accordance with "Instructions to Bidders".

.5 When products are specified by a referenced standard or by Performance specifications, upon request of Departmental Representative, obtain from manufacturer an independent laboratory report showing that the product meets or exceeds the specified requirements.

.16 Substitution after award of Contract:

.1 No substitutions are permitted without prior written approval of the Departmental Representative.

.2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and the proposed substitution.

.3 Proposals will be considered by the Departmental Representative if:

.1 products selected by tenderer from those specified are not available;

.2 delivery date of products selected from those specified would unduly delay completion of Contract, or

.3 alternative product to that specified, which is brought to the attention of and considered by Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount.

.4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as result of substitution.

.5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative, and the Contract price will be reduced accordingly.

1.14 EXAMINATION AND PREPARATION

.1 Existing Services:

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

.2 Location of Equipment and Fixtures:

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

1.15 EXECUTION REQUIREMENTS

.1 Preparation:

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which may be exposed by uncovering work; maintain excavations free of water.

.2 Execution:

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Provide openings in non-structural elements of Work for penetrations of electrical Work.

.6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.7 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Cut rigid materials using purpose made saw or core drill. Pneumatic or impact tools not allowed on brittle materials without prior approval.

.9 Restore work with new products in accordance with requirements of Contract Documents.

.10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material, full thickness of the construction element.

.12 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

.13 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

1.16 CLEANING

.1 Project Cleanliness:

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.3 Clear snow and ice from access to building.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Provide and use clearly marked separate bins for recycling. Refer to-Construction/Demolition Waste Management And Disposal.

.6 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.

.7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

.2 Final Cleaning:

.1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.

.3 Prior to final review, remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products and clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.5 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.

.6 Clean lighting reflectors, lenses, and other lighting surfaces.

.7 Vacuum clean and dust building interiors, behind grilles, louvres and screens.

.8 Wax, seal, vacuum clean, shampoo or prepare floor finishes, as recommended by manufacturer.

.9 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.10 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.11 Remove dirt and other disfiguration from exterior surfaces.

.12 Sweep and wash clean paved areas.

.14 Clean roofs, downspouts, and drainage systems.

.15 Remove snow and ice from access to building.

1.17 CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL

.1 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and/or recyclable materials and waste.

.1 Separate non-salvageable materials from salvaged items.

.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

.3 Transport and deliver non-salvageable items to licensed disposal facility.

.2 Provide containers to deposit reusable and/or recyclable materials. Locate containers in locations, to facilitate deposit of materials without hindering daily operations. Provide containers to deposit reusable and/or recyclable materials.

.3 Collect, handle, store on-site and transport off-site, salvaged materials in separate condition. Transport to approved and authorized recycling facility and/or users of material for recycling.

.4 Locate waste and salvage bins on site as directed by Departmental Representative.

1.18 CLOSEOUT PROCEDURES

.1 Inspection and Declaration:

.1 Contractor's Inspection: Conduct an inspection of Work with all subcontractors, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.2 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.

.3 Request Departmental Representative's Inspection.

.2 Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.

.3 Substantial Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and balanced and are fully operational.

.4 Fire alarm verification report per CAN/ULC-S537, confirmation of proper installation of fire alarm panel to CAN/ULC-S527 signed off by the fire alarm technician and confirmation of fire alarm emergency power capacity. 24-hour battery test as described in CAN/ULC-S537, signed off by fire alarm technician.

.5 Certificates required by Authority Having Jurisdictions for seismic restraints.

.6 Operation of systems have been demonstrated to Departments personnel.

.7 Work is complete and ready for Final Inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

1.19 CLOSEOUT SUBMITTAL

.1 Record Drawings:

.1 As work progresses, maintain accurate records to show all deviations from the Contract Drawings. Note on as-built drawings as changes occur. At completion supply:

.1 Submit one copy of as-built marked up set to Departmental Representative.

.2 Retain original logo and title block on the as-built drawings. Contractor may place on the upper right-hand title block area a small company logo, the text "AS-BUILT" and the date.

.3 Provide additional details on as-built drawings if requested to do so by Consultant or Departmental Representative.

.2 Maintenance manual:

.1 On completion of project submit to Departmental Representative four (4) USB Flash Drives copies and four (4) paper copies (in loose leaf type binder) of Operations and Maintenance Manual, made up as follows:

.1 Provide maintenance manual on USB Flash Drives using pdf, or other approved format for descriptive writing, page size images and page size drawings. Organize manuals into industry standard maintenance manual tabs with links in index to each descriptive section describing the component or maintenance procedure etc.

.2 Organize files into CSI Masterformat numbering system or other approved descriptive titles.

.3 Label drive "Operation and Maintenance Data", project name, date, names of Contractor, subcontractors, consultants and subconsultants.

.4 Include scanned guarantees, diagrams and drawings.

.5 Organize contents into applicable sections of work to parallel project specification break-down. Mark each section by labeled tabs (navigational buttons).

.6 Drawings, diagrams and manufacturer's literature must be legible.

.7 Refer to Electrical Divisions for specific details and data.

.3 Maintenance Materials, Special Tools and Spare Parts:

.1 Specific requirements for maintenance materials, tools and spare parts are specified in individual sections.

.2 Deliver maintenance materials, special tools and spare parts to Departmental Representative and store in designated area as directed by Departmental Representative.

.3 Prepare lists of maintenance materials, special tools and spare parts for inclusion in Manual specified in Clause 18.2.

.4 Maintenance materials:

.1 Deliver wrapped, identify on carton or package, colour, room number, system or area as applicable where item is used.

.5 Special tools:

.1 Assemble as specified;

.2 Include identifications and instructions on intended use of tools.

.6 Spare parts:

.1 Assemble parts as specified;

.2 Include part number, identification of equipment or system for which parts are applicable;

.3 Installation instructions;

.4 Name and address of nearest supplier.

.4 Warranties and Bonds:

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing in maintenance manual.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until the Date of Interim Completion is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Retain warranties and bonds until time specified for submittal.

END OF SECTION

1 PURPOSE

.1 To ensure that both the construction project and the institutional operations may proceed without undue disruption or hindrance and that the security of the Institution is maintained at all times.

2 DEFINITIONS

.1 "Contraband" means:

(a) an intoxicant, including alcoholic beverages, drugs and narcotics

(b) a weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization,

(c) an explosive or a bomb or a component thereof,

(d) currency over any applicable prescribed limit, $25.00, and

(e) any item not described in paragraphs (a) to (d) that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization.

.2 "Unauthorized smoking and related Items" means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing tobacco, cigarette making machines, matches and lighters.

.3 "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.

.4 "CSC" means Correctional Service Canada.

.5 "Director" means Director or Warden of the Institution as applicable or their representative.

.6 "Construction employees" means persons working for the general contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies. Workers 18 years or younger are not permitted within Institution.

.7 "Departmental Representative" means the Public Works and Government Services Canada representative defined in General Conditions.

.8 "Perimeter" means the fenced or walled area of the institution that restrains the movement of the inmates.

.9 "Construction zone" means the area, as indicated in the contract documents, that the contractor will be allowed to work". This area may or may not be isolated from the security area of the institution. Limits to be confirmed at construction start-up meeting.

.1 Construction zone for this contract includes the project location at William Head Institution.

3 PRELIMINARY PROCEEDINGS

.1 At construction start-up meeting:

.1 Discuss the nature and extent of all activities involved in the Project.

.2 Establish mutually acceptable security procedures in accordance with this instruction and the institution's particular requirements.

.2 The contractor's responsibilities:

.1 Ensure that all construction employees are aware of the CSC security requirements.

.2 Ensure that a copy of the CSC security requirements is always prominently on display at the job site.

.3 Co-operate with institutional personnel in ensuring that security requirements are observed by all construction employees.

4 CONSTRUCTION EMPLOYEES

.1 Submit to the Departmental Representative a list of the names with date of birth of all construction employees to be employed on the construction site and a security clearance form for each employee.

.2 Allow 10 working days for processing of security clearances. Employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's license. Security clearances obtained from other CSC institutions are not valid at this Institution except as approved otherwise.

.3 The Director may require that facial photographs may be taken of construction employees and these photographs may be displayed at appropriate locations in the Institution or in an electronic database for identification purposes. The Director may require that Photo ID cards be provided for all construction workers. ID cards will then be left at the designated entrance to be picked upon arrival at the institution and shall be displayed prominently on the construction employees clothing at all time while employees are at the institution.

.4 Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.

.5 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:

.1 appear to be under the influence of alcohol, drugs or narcotics.

.2 behave in an unusual or disorderly manner.

.3 are in possession of contraband.

.4 are 18 years old or younger.

5 VEHICLES

.1 All unattended vehicles on CSC property must have windows closed; fuel caps locked, doors and trunks locked and keys removed. The keys must be securely in the possession of the owner or an employee of the company that owns the vehicle.

.2 The director may limit at any time the number and type of vehicles allowed within the Institution.

.3 Drivers of delivery vehicles for material required by the project will require security clearances and must remain with their vehicle the entire time that the vehicle is in the Institution. The director may require that these vehicles be escorted by Institutional staff or

PWGSC Construction Escorts while in the Institution.

.4 If the Director permits trailers to be left inside the secure perimeter of the Institution, the trailer doors must be locked at all times. All windows must be securely locked bars when left unoccupied. Cover all windows with expanded metal mesh. When not in use lock all storage trailers located inside and outside the perimeter. All storage trailers inside and outside the perimeter must be locked when not in use.

6 PARKING

.1 The parking area(s) to be used by construction employees will be designated by the Director. Parking in other locations will be prohibited and vehicles may be subject to removal.

7 SHIPMENTS

.1 To avoid confusion with the Institution's own shipments, address all shipments of project material, equipment and tools in the Contractor's name and have a representative on site to receive any deliveries or shipments. CSC or PWGSC staff will NOT accept receipt of deliveries or shipments of any material equipment or tools for the contractor.

8 TELEPHONES

.1 The installation of telephones, facsimile machines and computers with Internet connections is not permitted within the Institution perimeter unless prior approved by the Director.

.2 The Director will ensure that approved telephones, facsimile machine and computers with Internet connections are located where they are not accessible to inmates. All computers will have an approved password protection that will stop an Internet connection to unauthorized personnel.

.3 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, Blackberries, PDAs, telephone used as 2-way radios are not permitted within the Institution unless approved by the Director. If wireless cellular telephones are permitted, the user will not permit their use by any inmate.

.4 The Director may approve but limit the use of 2-way radios.

9 WORK HOURS

.1 Work hours within the Institution are: conform to Division 1.

.2 Work is not permitted during weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waved by the Director.

10 OVERTIME WORK

.1 Conform to Division 1.

.2 Provide 48 hours advance notice to Director for all work to be performed after normal working hours of the Institution. Notify Director immediately if emergency work is required, such as to complete a concrete pour or make the construction site safe and secure.

11 TOOLS AND EQUIPMENT

.1 Maintain a complete list of all tools and equipment to be used during the construction project. Make this inventory available for inspection when required by the Institution.

.2 Throughout the construction project maintain up-to-date the list of tools and equipment specified above.

.3 Keep all tools and equipment under constant supervision, particularly power-driven and cartridge- driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.

.4 Store all tools and equipment in approved secure locations.

.5 Lock all tool boxes when not in use. Keys to remain in the possession of the employees of the contractor. Secure and lock scaffolding when not erected and when erected Secure in a manner agreed upon with the Institution designate.

.6 Report all missing or lost tools or equipment immediately to the Departmental Representative/Director

.7 The Director will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:

.1 At the beginning and conclusion of every work day or shift upon entering and exiting the Institution.

.2 At any time when contractor is on Institution property.

.8 Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Director's representative at the end of each day. Maintain up to date inventory of all used blades/cartridges.

.9 If propane or natural gas is used for heating the construction, the institution will require that the contractor supervise the construction site during non-working hours.

12 KEYS

.1 Security Hardware Keys.

.1 Arrange with the security hardware supplier/installer to have the keys for the security hardware to be delivered directly to Institution, specifically the Security Maintenance Officer (SMO).

.2 The SMO will provide a receipt to the Contractor for security hardware keys.

.3 Provide a copy of the receipt to the Departmental Representative.

.2 Other Keys

.1 Use standard construction cylinders for locks for his use during the construction period.

.2 Issue instructions to employees and sub-trades, as necessary, to ensure safe custody of the construction set of keys.

.3 Upon completion of each phase of the construction, the CSC representative will, in conjunction with the lock manufacturer:

.1 Prepare an operational keying schedule

.2 Accept the operational keys and cylinders directly from the lock manufacturer.

.3 Arrange for removal and return of the construction cores and install the operational core in all locks.

.4 Upon putting operational security keys into use, the PWGSC construction escort will obtain these keys as they are required from the SMO and open doors as required by the Contractor. The Contractor shall issue instructions to his employees advising them that all security keys shall always remain with the PWGSC construction escort.

13 SECURITY HARDWARE

.1 Turn over all removed security hardware to the Director of the Institution for disposal or for safekeeping until required for re-installation.

14 PRESCRIPTION DRUGS

.1 Employees of the contractor who are required to take prescription drugs during the workday shall obtain approval of the Director to bring a one day supply only into the Institution.

15 SMOKING RESTRICTIONS

.1 Smoking is not permitted inside correctional facilities or outdoors within the perimeter of a correctional facility and persons must not possess unauthorized smoking items within the perimeter of a correctional facility.

.2 Persons in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist will be directed to leave the Institution.

.3 Smoking is permitted outside the perimeter of a correctional facility in an area designated by the Director.

16 CONTRABAND

.1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on institutional property.

.2 The discovery of contraband on the construction site and the identification of the person(s) responsible for the contraband shall be reported immediately to the Director.

.3 Contractors should be vigilant with both their staff and the staff of their sub-contractors and suppliers that the discovery of contraband may result in cancellation of the security clearance of the affected employee. Serious infractions may result in the removal of the company from the Institution for the duration of the construction.

.4 Presence of arms and ammunition in vehicles of contractors, sub-contractors and suppliers or employees of these will result in the immediate cancellation of security clearances for the driver of the vehicle.

17 SEARCHES

.1 All vehicles and persons entering institutional property may be subject to search.

.2 When the Director suspects, on reasonable grounds, that an employee of the Contractor is in possession of contraband, he may order that person to be searched.

.3 All employees entering the Institution may be subject to screening of personal effects for traces of contraband drug residue.

18 ACCESS TO AND REMOVAL FROM INSTITUTIONAL PROPERTY

.1 Construction personnel and commercial vehicles will not be admitted to the institution after normal working hours, unless approved by the Director.

19 MOVEMENT OF VEHICLES

.1 Construction vehicles are not to leave the Institution until an inmate count is completed. Escorted commercial vehicles will be allowed to enter or leave the institution through the vehicle access gate during the following hours:

.1 AM: 0745 hrs. to 1100 hrs.

.2 PM: 1300hrs. to 1530 hrs.

.2 The contractor will advise the Director twenty four (24) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.

.3 Vehicles being loaded with soil or other debris, or any vehicle considered impossible to search, must be under continuous supervision by CSC staff or PWGSC construction escorts working under the authority of the Director.

.4 Commercial vehicles will only be allowed access to institutional property when their contents are certified by the Contractor or his representative as being strictly necessary to the execution of the construction project.

.5 Vehicles will be refused access to institutional property if, in the opinion of the Director, they contain any article which may jeopardize the security of the Institution. Arrange with Director for parking of contractor's vehicles at minimum security Institutions.

.6 Private vehicles of construction employees will not be allowed within the security wall or fence of medium or maximum security Institutions without the authorization of the Director.

.7 With the approval of the Director, certain equipment may be permitted to remain on the construction site overnight or over the weekend. This equipment must be securely locked, with the battery removed. The Director may require that the equipment be secured with a chain and padlock to another solid object.

20 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY

.1 Subject to the requirements of good security, the Director will permit the Contractor and his employees as much freedom of action and movement as is possible.

.2 However, notwithstanding paragraph above, the Director may:

.1 Prohibit or restrict access to any part of the Institution.

.2 Require that in certain areas of the Institution, either during the entire construction project or at certain intervals, construction employees only be

allowed access when accompanied by a member of the CSC Security Staff or PWGSC Construction Escort Officer.

.3 During the lunch and coffee/health breaks, all construction employees will remain within the construction site. Construction employees are not permitted to eat in the Institution cafeteria and dining room.

21 SURVEILLANCE AND INSPECTION

.1 Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met.

.2 CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among construction employees and maintained throughout the construction project.

22 STOPPAGE OF WORK

.1 The director may request at any time that the contractor, his employees, sub-contractors and their employees not enter or leave the work site immediately due to a security situation occurring within the Institution. The contractor's site supervisor will note the name of the staff member giving the instruction, the time of the request and obey the order as quickly as possible.

.2 The contractor shall advise the Departmental Representative of this interruption of the work within 24 hours.

23 CONTACT WITH INMATES

.1 Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any employee doing any of the above will be removed from the site and his security clearance revoked.

.2 Digital cameras (or any other type) are not allowed on CSC property.

.3 Notwithstanding the above paragraph, if the director approves of the use of cameras, it is strictly forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this contract.

24 COMPLETION OF CONSTRUCTION PROJECT

.1 Upon completion of the construction project or, when applicable, the takeover of a facility, the Contractor shall remove all remaining construction material, tools and equipment that are not specified to remain in the Institution as part of the construction contract.

END OF SECTION

PART 1 - GENERAL

1.1 References

.1 Government of Canada.

.1 Canada Labour Code - Part II

.2 Canada Occupational Health and Safety Regulations.

.2 National Building Code of Canada (NBC):

.1 Part 8, Safety Measures at Construction and Demolition Sites.

.3 Canadian Standards Association (CSA) as amended:

.1 CSA Z797-2009 Code of Practice for Access Scaffold

.2 CSA S269.1-1975 (R2003) Falsework for Construction Purposes

.3 CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures

.4 Fire Protection Engineering Services, HRSDC:

.1 FCC No. 301, Standard for Construction Operations.

.2 FCC No. 302, Standard for Welding and Cutting.

.5 National Building Code of Canada (NBCC 2005):

.1 Part 8, Safety Measures at Construction and Demolition Sites

.6 American National Standards Institute (ANSI):

.1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.

.7 Province of British Columbia:

.1 Workers Compensation Act Part 3-Occupational Health and Safety.

.2 Occupational Health and Safety Regulation

1.2 Related Sections

.1 Refer to the following current NMS sections as required:

.1 Section 01 01 50 General Requirements

1.3 Workers' Compensation Board Coverage

.1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.

.2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.4 Compliance with Regulations

.1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.

.2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.5 Submittals

.1 Submit to Departmental Representative submittals listed for review in accordance with Section 01 01 50.

.2 Work effected by submittal shall not proceed until review is complete.

.3 Submit the following:

.1 Health and Safety Plan.

.2 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.

.3 Copies of incident and accident reports.

.4 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.

.5 Emergency Procedures.

.4 The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 10 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative.

.5 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.

.6 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:

.1 Be construed to imply approval by the Departmental Representative.

.2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.

.3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.6 Responsibility

.1 Assume responsibility as the Prime Contractor for work under this contract. Note that there will be another contractor on site, working in parallel, to perform electrical works in the main electrical room. Refer to the electrical drawings for their scope. Perform role of Prime Contractor and be responsible for the health and safety program (per WorksafeBC) of the construction site while these other contractors/trades are working on site.

.2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.3 Comply with and enforce compliance by employees with safety requirements of Contract documents, applicable Federal, Provincial, Territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.7 Health and Safety Coordinator

.1 The Health and Safety Coordinator (Registered Occupational Hygienist, Certified Industrial Specified Hygienist) must:

.1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.

.2 Be responsible for implementing, daily enforcing, and monitoring the site specific Health and Safety Plan.

.3 Be on site during execution of work.

1.8 General Conditions

.1 Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.

.1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

.2 Secure site at night time or provide security guard as deemed necessary to protect site against entry.

1.9 Regulatory Requirements

.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.

.2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.10 Work Permits

.1 Obtain specialty permit related to project before start of work.

1.11 Filing of Notice

.1 The General Contractor is to complete and submit a Notice of Project as required by Provincial authorities.

.2 Provide copies of all notices to the Departmental Representative.

1.12 Health and Safety Plan

.1 Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.

.2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:

.1 Primary requirements:

.1 Contractor's safety policy.

.2 Identification of applicable compliance obligations.

.3 Definition of responsibilities for project safety/organization chart for project.

.4 General safety rules for project.

.5 Job-specific safe work, procedures.

.6 Inspection policy and procedures.

.7 Incident reporting and investigation policy and procedures.

.8 Occupational Health and Safety Committee/Representative procedures.

.9 Occupational Health and Safety meetings.

.10 Occupational Health and Safety communications and record keeping procedures.

.2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.

.3 List hazardous materials to be brought on site as required by work.

.4 Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.

.5 Identify personal protective equipment (PPE) to be used by workers.

.6 Identify personnel and alternates responsible for site safety and health.

.7 Identify personnel training requirements and training plan, including site orientation for new workers.

.3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.

.4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.

.5 Departmental Representative's review: the review of Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

1.13 Emergency Procedures

.1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:

.1 Designated personnel from own company.

.2 Regulatory agencies applicable to work and as per legislated regulations.

.3 Local emergency resources.

.4 Departmental Representative.

.2 Include the following provisions in the emergency procedures:

.1 Notify workers and the first-aid attendant, of the nature and location of the emergency.

.2 Evacuate all workers safely.

.3 Check and confirm the safe evacuation of all workers.

.4 Notify the fire department or other emergency responders.

.5 Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.

.6 Notify Departmental Representative.

.3 Provide written rescue/evacuation procedures as required for, but not limited to:

.1 Work at high angles.

.2 Work in confined spaces or where there is a risk of entrapment.

.3 Work with hazardous substances.

.4 Underground work.

.5 Work on, over, under and adjacent to water.

.6 Workplaces where there are persons who require physical assistance to be moved.

.4 Design and mark emergency exit routes to provide quick and unimpeded exit.

.5 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

1.14 Hazardous Products

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.

.2 Where use of hazardous and toxic products cannot be avoided:

.1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 01 50.

.2 In conjunction with Departmental Representative, schedule to carry out work during "off hours" when tenants have left the building.

1.15 Electrical Safety Requirements

.1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

.1 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.

.2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

1.16 Electrical Lockout

.1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

.2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.

.3 Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative.

1.17 Overloading

.1 Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.18 Falsework

.1 Design and construct falsework in accordance with CSA S269.1.

1.19 Scaffolding

.1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 Code of Practice for Access Scaffold and BC Occupational Health and Safety Regulations.

1.20 Confined Spaces

.1 Carry out work in confined spaces in compliance with Provincial regulations.

1.21 Power-Actuated Devices

.1 Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.

1.22 Fire Safety and Hot Work

.1 Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.

.2 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

1.23 Fire Safety Requirements

.1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.24 Fire Protection and Alarm System

.1 Do not obstruct, shut-off or leave inactive at the end of a working day or shift, the fire protection and alarm systems.

.2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.

.3 Be responsible/liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

1.25 Unforeseen Hazards

.1 Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.

1.26 Posted Documents

.1 Post legible versions of the following documents on site:

.1 Health and Safety Plan.

.2 Sequence of work.

.3 Emergency procedures.

.4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.

.5 Notice of Project.

.6 Floor plans or site plans. Must be posted in a non-inmate access are and locked up when not being used.

.7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.

.8 Workplace Hazardous Materials Information System (WHMIS) documents.

.9 Material Safety Data Sheets (MSDS).

.10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.

.3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

1.27 Meetings

.1 Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

1.28 Correction of Non-Compliance

.1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.

.3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The General Contractor/subcontractors will be responsible for any costs arising from such a "stop work order".

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute (ANSI)/International Electrical Testing Association (NETA)

.1 ANSI/NETA ATS-2009, Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

.2 ANSI/NETA MTS-2007, Standard for Maintenance Testing Specifications for Electrical Power Equipment and Systems

1.2 QUALITY ASSURANCE

.1 Provide third party commissioning agent(s) for electrical systems. Include commissioning costs in tender price.

.2 Commissioning Agent(s) for testing shall be certified in accordance with ANSI/NETA ETT-2000 with on-site crew leaders holding a current certification level of Level III or higher in electrical testing. Comply with applicable procedures and standards of the certification sponsoring association.

.3 The Commissioning Agent(s) to be responsible for scheduling inspections and including reports in their final submission prior to turnover.

1.3 SUBMITTALS

.1 Submit the names of a minimum three (3) commissioning agents proposed to perform commissioning and testing services, complete with references and CV of each member of the agency who will be doing the work for this project. Submit documentation to confirm agencies compliance with quality assurance provision.

.2 Prior to commencing commissioning services, submit 3 preliminary specimen copies of each of report forms proposed for use.

.3 Upon completion of commissioning services, prepare and submit preliminary report. Prepare final report with corrections and completed work requested, at time of turnover. Submit 3 copies and one electronic PDF file of final reports on approved forms.

.4 The project will not be turned over without a final report showing no deficiencies or outstanding work. Once the building is occupied there will be no opportunities to return to the range to complete work unless escorted.

1.4 PROCEDURES - GENERAL

.1 Comply with procedural standards of certifying association under whose standard services will be performed.

.2 Notify Departmental Representative 3 days prior to beginning of operations.

.3 Accurately record data for each step.

.4 Report immediately to Departmental Representative any deficiencies or defects noted during performance of services.

1.5 FINAL REPORTS

.1 Commissioning agent to prepare final reports. Submit Operation and Maintenance manuals, testing results and reports to Commissioning Agent for final submission to Departmental Representative.

.2 Ensure each form bears signature of recorder, and that of supervisor of reporting organization.

.3 Identify each instrument used, and latest date of calibration of each.

1.6 COMMISSIONING AGENT'S RESPONSIBILITIES

.1 Unless otherwise outlined in the requirements of Division 26, conduct testing and commissioning of the Electrical Equipment supplied and installed under the General Contract in accordance ANSI/NETA standards.

.2 Unless otherwise outlined in the requirements of Division 26, conduct electrical system testing in accordance with ANSI/NETA standards.

.3 Conduct an inspection and sign off on every detail in each assembly and system based on the requirements stipulated in the specification. Provide to the Departmental Representative, a full schedule of items to be inspected.

1.7 PREPARATION

.1 Provide instruments required for testing, adjusting, and load balancing operations.

.2 Make instruments available to Departmental Representative to facilitate spot checks during testing.

.3 Retain possession of instruments and remove at completion of services.

.4 Verify systems installation is complete and in continuous operation.

1.8 EXECUTION

.1 Conduct room to room inspection.

.2 Test equipment, and balance electrical systems.

.3 For schedule of Electrical systems requiring testing, start up and verification refer to Division 26, where it applies to the electrical systems.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 Demonstrate scheduled operation and maintenance of equipment and systems to Departmental Representative's personnel two weeks prior to date of interim completion.

.2 Departmental Representative will provide list of CSC personnel to Contractor and coordinate dates and times.

1.2 QUALITY CONTROL

.1 When specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Departmental Representative's personnel, and provide written report that demonstration and instructions have been completed.

1.3 SUBMITTALS

.1 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.

.2 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.3 Give time and date of each demonstration, with list of persons present.

1.4 CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation.

.2 Testing, adjusting, and balancing has been performed in accordance with Section 01 91 13 - Commissioning and equipment and systems are fully operational.

.3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.5 PREPARATION

.1 Verify that conditions for demonstration and instructions comply with requirements.

.2 Verify that designated personnel are present.

1.6 DEMONSTRATION AND INSTRUCTIONS

.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.

.2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.

.3 Review contents of manual in detail to explain all aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

END OF SECTION

Part 1 General

1.1 MEASUREMENT AND PAYMENT

.1 Removal of existing asphalt pavement will be measured in square metres of surface actually removed regardless of depth removed.

.2 Payment under this item will include operations involved in removing, hauling and stockpiling designated pavement and cleaning of remaining pavement surface.

1.2 REFERENCES

.1 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

Part 2 Execution

2.1 PREPARATION

.1 Prior to beginning removal operation, inspect and verify with Departmental Representative areas, depths and lines of asphalt pavement to be removed.

.2 Protection: protect existing pavement not designated for removal, light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

2.2 REMOVAL

.1 Remove existing asphalt pavement as required and as established by Departmental Representative in field.

.2 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement.

.3 Prevent contamination of removed asphalt pavement by topsoil, underlying gravel or other materials.

.4 Suppress dust generated by removal process.

2.3 FINISH TOLERANCES

.1 Finished surfaces in areas where asphalt pavement has been removed to be within +/-10 mm of grade specified but not uniformly high or low.

2.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 01 50 – General Instructions.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 01 50 – General Instructions.

.3 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooming as required.

.4 Waste Management: separate waste materials for recycling in accordance with Section 01 01 50 – General Instructions.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.2 Removed asphalt pavement which is to be recycled in hot mix asphalt concrete under this contract may be stockpiled at designated asphalt plant site.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Alteration project procedures.

.2 Removal and or salvage of designated construction.

.3 Disposal of materials.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA S350-M1980(R1998), Code of Practice for Safety in Demolition of Structures.

.2 National Building Code Part 8

1.3 SUBMITTALS

.1 Submit detailed schedule for any and all work affecting the existing building. Consult with CSC regarding work required. Submit schedule minimum 10 calendar days prior to scheduled work.

.2 Comply with requirement of 01 01 50 – General Instructions.

1.4 SCHEDULING

.1 Reference requirements in section 01 01 50 – General Instructions

.2 Perform noisy, malodorous, dusty, work:

.1 As directed by CSC and the Departmental Representative.

1.5 SUBMITTALS

.1 Submit with the project schedule a coordinated complete series of drawings diagrams, details and supporting data clearly showing sequence of demolition and removal work, reconstruction, occupant moves required, material storage, temporary barriers for all phases of the demolition construction work.

.2 The contractor will not be permitted to proceed until agreement with CSC and the Departmental Representative are obtained on the schedule and drawings.

.3 Submit the qualifications and names of the persons experienced and qualified for the deconstruction work as described below.

1.6 SITE CONDITIONS

.1 Review the Project Specific Hazardous Building Materials Assessment for William Head Institution with the Departmental Representative.

.1 Remove hazardous materials in a manner consistent with the Occupational Health & Safety Regulation, General Hazard Requirements of the Work Safe BC, and other applicable regulations. Changes to the Work will be dealt in accordance with the provisions of the Contract Documents.

.2 Handle and dispose of all hazardous and banned materials in accordance with the Special Waste Regulation, and Regional and Municipal regulations. These hazardous and banned materials include but are not limited to asbestos, drywall (banned from disposal), underground storage tanks, Polychlorinated Biphenyls (PCBs), abandoned chemicals (gasoline, pesticides, herbicides, flammable and combustible substances), freon from cooling equipment, lead-based paints, smoke detectors, and mercury containing switches.

.2 Should material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.

.1 Do not proceed until written instructions have been received from Departmental Representative.

.3 Notify Departmental Representative minimum 5 working days before disrupting building access or services.

.4 The Contractor shall accept the site as it exists and will be responsible for all deconstruction work as required.

1.7 ALTERATION PROJECT PROCEDURES

.1 Scope: Reference Electrical Drawing E000, E001, E100, and Specifications.

.1 The approximate operating hours of the specific facility spaces is as follows:

- Programs Wing staff office area 7:30 to 16:00 Monday to Friday closed on weekends.
- Programs wing school area 7:30 to 16:00 Monday to Friday, closed on weekends.
- The Library and some of the class rooms are used in the evening until 22:00 all week.
- Case Management areas 7:30 to 16:00 Monday to Friday, closed on weekends.
- Center section area rooms 46 and 47 can be 24 /7.

.2 The institution may accommodate various deviations for the noted operating hours of the specific spaces noted. Contractor may coordinate with Departmental Representative.

.3 The project is required to be completed in phases. Within the tender documentation there is an estimated five phases. The contractor is to consider this

scheme as a basis for developing the management and construction of the project.

.4 Remove and reconstruct existing construction as required to install the requirements of the documents.

.5 Existing Conditions:

.1 Visit site at own expense prior to submission of bids and must take whatever time is required to ascertain existing site conditions and surrounding features related to the proposed deconstruction.

.2 Confirm conditions are suitable for execution of the work. No additional sums of money will be allowed for after acceptance of bid for any items resulting from lack of understanding and familiarity with the site conditions, and failing to report immediately to the Departmental Representative any discrepancies observed on site that are in conflict with the intent of drawings and specifications.

.3 Accept the site as it exists and be responsible for all deconstruction work as required.

.4 The contractor must include all costs for the work in the existing building.

.2 Materials: As specified in Product sections; match existing Products and work for patching and extending work.

.3 Employ skilled and experienced installer to perform alteration work.

.4 Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.

.5 Remove, cut, and patch Work in a manner to minimize damage and to provide means of restoring Products and finishes to original condition.

.6 Refinish existing visible surfaces to remain in renovated rooms and spaces, to renewed condition for each material, with a neat transition to adjacent finishes.

.7 Where new Work abuts or aligns with existing, provide a smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.

.8 When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to Departmental Representative for review.

.9 Where a change of plane of 6 mm or more occurs, submit recommendation for providing a smooth transition; to Departmental Representative for review. Request instructions from the Departmental Representative.

.10 Patch or replace portions of existing surfaces which are damaged, lifted, discoloured, or showing other imperfections.

.11 Finish surfaces as specified in individual Product sections.

1.8 PROTECTION

.1 Prevent movement, settlement, or other damage to adjacent structures, utilities, and parts of building to remain in place. Provide bracing and shoring required.

.2 Keep noise, dust, and inconvenience to occupants to a minimum.

.1 Refer to Section 01 01 50 General Instructions

.2 Noisy work will only be permitted at times agreed to and accepted by the Departmental Representative.

.3 Protect building mechanical and electrical systems, services and equipment.

.4 Provide temporary dust screens, covers, railings, supports and other protection as required.

.5 Do not overload any portion of the structure with material or equipment

.6 Where existing load bearing partitions are to be removed, do not commence work until new support structure is installed, inspected and approved by the Departmental Representative.

.7 Cease operations and notify the Departmental Representative if safety of any adjacent work or structure appears to be endangered. Take all precautions to support the structure. Do not resume operations until reviewed with the Departmental Representative.

.8 Ensure safe passage of building occupants around area of demolition. Remove debris and clean areas of access immediately.

1.9 PROJECT CONDITIONS

.1 Conduct demolition to minimize interference with adjacent and occupied building areas.

1.10 QUALITY ASSURANCE

.1 Salvage or Demolition Firm: Company (ies) must be experienced and specializing in performing the work of this section with documented experience in similar types of deconstruction work.

.2 Qualifications of Workers: Provide a supervisor who shall be present at all times during the deconstruction work and who shall be thoroughly familiar with the work required and who shall direct all work. Provide one (1) person on site who is responsible for maintaining the safety barriers and protection of the workers and the public.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 PREPARATION

.1 Inspect building & site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Provide, erect, and maintain temporary barriers security partitions at locations indicated agreed to with CSC and the Departmental Representative.

.1 Erect and maintain temporary partitions to prevent spread of dust, odours, and noise to permit continued occupancy. Refer to phasing notes on drawings. The extent of the partitions required may exceed the information shown on the phasing drawing or demolition drawings.

.3 Erect and maintain weatherproof closures for exterior openings.

.4 Protect existing materials which are not to be demolished.

.5 Prevent movement of structure; provide bracing and shoring.

3.2 PROTECTION

.1 Maintain public safety and traffic control precautions at all times during the demolition work, using properly trained qualified persons to control all Contractor's activities, vehicles, equipment, traffic and all public pedestrian and vehicles traffic that are coming to and from the site or passing along the vicinity of the site access locations.

.2 Prevent movement, settlement, or damage to adjacent structures, utilities, and parts of building to remain in place. Provide bracing and shoring required.

.3 Keep noise, dust, and inconvenience to occupants to minimum.

.4 Protect building systems, services and equipment.

.5 Do Work in accordance with Section 01 35 33 - Health and Safety.

3.3 SALVAGE

.1 Refer to demolition drawings and specifications for items to be salvaged for reuse.

.2 Remove items to be reused, store as directed by Departmental Representative and re-install under appropriate section of specification.

3.4 SITE REMOVALS

.1 Remove items as indicated.

3.5 DEMOLITION

.1 The electrical, BSCS, Mechanical services MUST NOT be terminated within the building at any time. Notify the building Departmental Representative of any requirements for partial termination of services in accordance with Division 1 requirements. Keep down time at a minimum.

.2 Remove parts of existing building to permit new construction. Sort materials into appropriate piles for reuse, recycling, or disposal.

.1 Demolish in an orderly and careful manner. Protect existing supporting structural members.

.2 Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.

.3 Remove temporary Work.

3.6 DISPOSAL

.1 Dispose of removed materials, to appropriate recycling facilities except where specified otherwise, in accordance with authority having jurisdiction.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 02 82 00.02 - Asbestos Abatement - Intermediate Precautions

1.2 REFERENCES

.1 Reports

.1 "Hazardous Materials Survey – Administration Building, William Head Institution, Correctional Services Canada, Victoria, British Columbia", prepared by North West Environmental Group Ltd., dated March, 2015 (Assessment Report).

.2 Definitions:

.1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.

.2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.

.3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

.3 Reference Standards:

.1 Canadian Environmental Protection Act,1999 (CEPA 1999)

.1 Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations (SOR/2005-149).

.2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.3 National Research Council Canada Institute for Research in Construction (NRC-IRC)

.1 National Fire Code of Canada-2005.

.4 WorkSafe BC

.1 British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97, including amendments to date of work)

.2 "Safe Work Practices for Handling Asbestos" (2012 Edition)

.3 "Lead-Containing Paints and Coatings; Preventing Exposure in the Construction Industry", 2011

.5 Canadian Construction Association (CCA)

.1 Standard Construction Document CCA 82 "mould guidelines for the Canadian construction industry", 2004

.6 The current version of the British Columbia Hazardous Waste Regulation (BC Reg. 63/88)

.7 The Federal Transportation of Dangerous Goods Regulation

.8 The Federal PCB Regulations (SOR/2008-273).

.9 The British Columbia Waste Management Act - Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99).

.10 The Federal Halocarbons Regulation, July 2003

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 01 50 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for hazardous materials (if such are to be used during the Work) and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS MSDS in accordance with Sections 01 35 33 - Health and Safety to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.

.3 Submit hazardous materials management plan to Departmental Representative that identifies hazardous materials, usage, location, personal protective equipment requirements, and disposal arrangements.

.4 Low-Emitting Materials: submit listing of adhesives and sealants used in building, comply with VOC and chemical component limits or restrictions requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.

.4 Storage and Handling Requirements:

.1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.

.2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.

.3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada requirements.

.4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.

.1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.

.2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.

.5 Transfer of flammable and combustible liquids is prohibited within buildings.

.6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.

.7 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.

.8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.

.9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.

.10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:

.1 Store hazardous materials and wastes in closed and sealed containers.

.2 Label containers of hazardous materials and wastes in accordance with WHMIS.

.3 Store hazardous materials and wastes in containers compatible with that material or waste.

.4 Segregate incompatible materials and wastes.

.5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.

.6 Store hazardous materials and wastes in secure storage area with controlled access.

.7 Maintain clear egress from storage area.

.8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.

.9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.

.10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

.11 When hazardous waste is generated on site:

.1 Co-ordinate transportation and disposal with Departmental Representative.

.2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.

.3 Use licensed carrier authorized by provincial authorities to accept subject material.

.4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.

.5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.

.6 Only trained personnel handle, offer for transport, or transport dangerous goods.

.7 Provide photocopy of shipping documents and waste manifests to Departmental Representative.

.8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide photocopy of completed manifest to Departmental Representative.

.9 Report discharge, emission, or escape of hazardous materials immediately to Departmental Representative and appropriate provincial authority. Take reasonable measures to control release.

.12 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.

.13 Report spills or accidents immediately to Departmental Representative Submit a written spill report to Departmental Representative within 24 hours of incident.

Part 2 Products

2.1 MATERIALS

.1 Description:

.1 Bring on site only quantities hazardous material required to perform Work.

.2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

Part 3 Execution

3.1 HAZARDOUS MATERIALS ABATEMENT

.1 Where impacts and/or disturbance to identified hazardous materials (as indicated in the Assessment Report) are required as part of the Work, abatement shall be conducted to remove and dispose of those hazardous building materials that will be impacted in accordance with applicable regulations, guidelines, standards and/or best practices for such work.

.2 The listing below is a summary of the identified hazardous building materials (other than asbestos – Section 02 82 00.02 - Asbestos Abatement - Intermediate Precautions) and associated removal and disposal regulations, guidelines and/or standards to be considered during the Work.

.1 Lead

.1 Paints with lead concentrations in excess of 600 ppm were not identified in the Assessment Report.

.2 Corrective action or remedial work on paint applications containing any concentration of lead should be undertaken in a manner so as to avoid generating fine particulate matter or dust (i.e., avoid sanding). Airborne lead dust or fumes should not exceed BC Reg. 296/97 8-hour Occupational Exposure Limit (OEL) of 0.05 milligram per cubic metre (mg/m^3) during the removal of paints and products containing any concentration of lead. The use of personal protective equipment is recommended to reduce the potential for over-exposure to lead dust.

.2 Polychlorinated Biphenyls (PCBs)

.1 Where removal of fluorescent light fixtures is required as part of the Work:

.1 Remove fluorescent lamp fixtures. Assess all ballasts in comparison to the Environment Canada document entitled

"Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2", dated August 1991 (or equivalent reference).

.2 Sort PCB-containing lamp ballasts from non-PCB-containing lamp ballasts.

.2 Transport PCB waste in accordance the Federal Transportation of Dangerous Goods Regulation.

.3 Dispose of PCB waste in accordance with the current version of the British Columbia Hazardous Waste Regulation (BC Reg. 63/88) and The Federal PCB Regulations (SOR/2008-273).

.3 Mould

.1 The presence of mould contamination was not identified in the Assessment Report.

.2 If mould and/or rodent/avian droppings are identified during the project, and the impacted materials are to be removed by hand, workers should be notified of the presence of these contaminants and be provided with respiratory protection and/or other personal protective equipment (PPE) as deemed necessary for the work that they will be conducting.

.4 Mercury

.1 Where thermostats with mercury-containing switches, fluorescent light tubes, high intensity discharge lights (mercury vapour) and/or other mercury-containing items require removal as part of the Work, conduct removal to separate mercury-containing items in-tact for appropriate transportation and disposal.

.2 Transport mercury waste in accordance with the Federal Transportation of Dangerous Goods Regulation.

.3 Dispose of mercury waste in accordance with the current version of the British Columbia Hazardous Waste Regulation (BC Reg. 63/88)..

.5 Silica

.1 According to the Assessment Report, silica is assumed to be present in concrete, cement, mortar, drywall, plaster, ceramic tiles, floor tiles and stucco.

.2 Where silica-containing materials are to be disturbed as part of the Work, ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limit as stipulated by BC Reg. 296/97 (0.025 mg/m^3). This would include, but not be limited to, the following:

.1 Providing workers with respiratory protection

.2 Wetting the surface of the materials, use of water or dust suppressing agents to prevent dust emissions

.3 Providing workers with facilities to properly wash prior to exiting the work area

.3 Transport silica waste in accordance with the Federal Transportation of Dangerous Goods Regulation.

.4 Dispose of silica waste in accordance with the current version of the British Columbia Hazardous Waste Regulation (BC Reg. 63/88)

.6 Radioactive Materials

.1 According to the Assessment Report, smoke detectors containing sealed 241Americium sources are present.

.2 Where smoke detectors are to be removed as part of the Work, they should be collected and disposed of in accordance with Canadian Safety Commission regulations.

.3 Alternatively, if still functional, they can be reused for their original intended purpose.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 01 50 – General Instructions. Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 01 50 – General Instructions.

.3 Waste Management: dispose of waste materials in accordance with the provisions of this Section

.1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.

.2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.

.3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.

.4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.

.5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.

.6 Dispose of hazardous wastes in timely fashion in accordance with applicable federal and provincial regulations.

.7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

.8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:

.1 Hazardous wastes recycled in manner constituting disposal.

.2 Hazardous waste burned for energy recovery.

.3 Lead-acid battery recycling.

.4 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Refer to following report (attached in Appendix A) for information pertaining to the asbestos-containing materials (ACMs) that have been identified and that may be impacted by the Work.

.1 "Hazardous Materials Survey – Administration Building, William Head Institution, Correctional Services Canada, Victoria, British Columbia", prepared by North West Environmental Group Ltd., dated March, 2015 (Assessment Report).

.2 Unless otherwise determined through risk assessment conducted by a qualified person, comply with requirements of this Section when disturbance to the following materials is required to complete the Work:

.1 Asbestos-containing pipe penetration caulking (black OR dark red) present throughout.

.2 Asbestos-containing ductwork penetration caulking (grey) present throughout.

.3 Asbestos-containing floor tiles (12"x12" size, cream with streaks) present throughout the main floor and janitor closet on 2nd floor.

.4 Asbestos-containing gasket materials present on the boiler return line.

.5 Asbestos containing fire stop present on heat shield on boiler exhaust.

.3 Please note that the Contractor is to contact the Departmental Representative immediately if suspected asbestos-containing cement pipes or pipe terminations are discovered in existing manholes.

1.2 SECTION INCLUDES

.1 Requirements and procedures for abatement of asbestos containing materials of the types described within.

1.3 RELATED REQUIREMENTS

.1 Section 02 81 01 – Hazardous Materials

1.4 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.205-94, Sealer for Application of Asbestos Fibre Releasing Materials.

.2 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act, 1999 (CEPA).

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.4 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

.5 Underwriters' Laboratories of Canada (ULC)

.6 WorkSafe BC

.1 British Columbia's Occupational Health and Safety Regulation (BC Reg. 296/97, including amendments to date of work)

.2 "Safe Work Practices for Handling Asbestos" (2012 Edition)

.7 The current version of the British Columbia Hazardous Waste Regulation (BC Reg. 63/88)

1.5 DEFINITIONS

.1 Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow wetting of fibres.

.2 Asbestos Containing Materials (ACMs): materials that contain 0.5 per cent or more asbestos by dry weight and are identified under Existing Conditions including fallen materials and settled dust, and vermiculite insulation materials containing any concentration of asbestos.

.3 Asbestos Work Area: area where work takes place which will, or may disturb ACMs.

.4 Authorized Visitors: Departmental Representative, and representatives of regulatory agencies.

.5 Competent worker: in relation to specific work, means a worker who:

.1 Is qualified because of knowledge, training and experience to perform the work.

.2 Is familiar with the provincial and federal laws and with the provisions of the regulations that apply to the work.

.3 Has knowledge of all potential or actual danger to health or safety in the work.

.6 Friable Materials: material that when dry can be crumbled, pulverized or powdered by hand pressure and includes such material that is crumbled, pulverized or powdered.

.7 Glove Bag: prefabricated glove bag as follows:

.1 Minimum thickness 0.25 mm (10 mil) polyvinyl-chloride bag.

.2 Integral 0.25 mm (10 mil) thick polyvinyl-chloride gloves and elastic ports.

.3 Equipped with reversible double pull double throw zipper on top and at approximately mid-section of the bag.

.4 Straps for sealing ends around pipe.

.8 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with filter system capable of collecting and retaining fibres greater than 0.3 microns in any dimension at 99.97% efficiency.

.9 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure.

.10 Occupied Area: any area of building or work site that is outside Asbestos Work Area.

.11 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required to provide protection and isolation.

.12 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must have appropriate capacity for scope of work.

1.6 SUBMITTALS

.1 Submittals in accordance with Section 01 01 50 – General Instructions.

.2 Submit proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of asbestos containing waste in accordance with requirements of authority having jurisdiction.

.3 Submit Provincial and/or local requirements for Notice of Project Form.

.4 Submit proof of Contractor's Asbestos Liability Insurance.

.5 Submit to Departmental Representative necessary permits for transportation and disposal of asbestos containing waste and proof that asbestos containing waste has been received and properly disposed.

.6 Submit proof satisfactory to Departmental Representative that all asbestos workers have received appropriate training and education by a competent person in the hazards of asbestos exposure, good personal hygiene, entry and exit from Asbestos Work Area, aspects of work procedures and protective measures while working in Asbestos Work Areas, and the use, cleaning and disposal of respirators and protective clothing.

.7 Submit proof that supervisory personnel have attended asbestos abatement course, of not less than two days duration. Minimum of one supervisor for every ten workers.

.8 Submit Worker's Compensation Board status and transcription of insurance.

.9 Submit documentation including test results, fire and flammability data, and Material Safety Data Sheets (MSDS) for chemicals or materials including:

- .1 Encapsulants;
- .2 Amended water;
- .3 Slow drying sealer.

.10 Submit proof satisfactory to Departmental Representative that employees have respirator fitting and testing. Workers must be fit tested (irritant smoke test) with respirator that is personally issued.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements: comply with Federal, Provincial and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at the time work is performed.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety.

.2 Safety Requirements: worker and visitor protection.

.1 Protective equipment and clothing to be worn by workers while in Asbestos Work Area at a minimum include:

.1 Air purifying half-mask respirator with N-100, R-100 or P-100 particulate filter, personally issued to worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to Provincial Authority having jurisdiction.. The respirator to be fitted so that there is an effective seal between the respirator and the worker's face, unless the respirator is equipped with a hood or helmet. The respirator is to be cleaned, disinfected and inspected after use on each shift, or more often if necessary, when issued for the exclusive use of one worker, or after each use when used by more than one worker. The respirator is to have damaged or deteriorated parts replaced prior to being used by a worker; and, when not in use, to be stored in a convenient, clean and sanitary location. The employer to establish written procedures regarding the selection, use and care of respirators, and a copy of the procedures to be provided to and reviewed with each worker who is required to wear a respirator. A worker not to be assigned to an operation requiring the use of a respirator unless he or she is physically able to perform the operation while using the respirator.

.2 Disposable type protective clothing that does not readily retain or permit penetration of asbestos fibres. Protective clothing to be provided by the employer and worn by every worker who enters the work area, and the protective clothing to consist of a head covering and full body covering that fits snugly at the ankles, wrists and neck, in order to prevent asbestos fibres from reaching the garments and skin under the protective clothing. It includes suitable footwear, and it to be repaired or replaced if torn.

.3 Eating, drinking, chewing, and smoking are not permitted in Asbestos Work Area.

.4 Before leaving Asbestos Work Area, the worker can decontaminate his or her protective clothing by using a vacuum equipped with a HEPA filter, or by damp wiping, before removing the protective clothing, or, if the protective clothing will not be reused, place it in a container for dust and waste. The container to be dust tight, suitable for asbestos waste, impervious to asbestos, identified as asbestos waste, cleaned with a damp cloth or a vacuum equipped with a HEPA filter immediately before removal from the work area, and removed from the work area frequently and at regular intervals.

.5 Ensure workers wash hands and face when leaving Asbestos Work Area..

.6 Ensure that no person required to enter an Asbestos Work Area has facial hair that affects seal between respirator and face.

.7 Visitor Protection:

.1 Provide protective clothing and approved respirators to Authorized Visitors to work areas.

.2 Instruct Authorized Visitors in the use of protective clothing, respirators and procedures.

.3 Instruct Authorized Visitors in proper procedures to be followed in entering into and exiting from Asbestos Work Area.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal packaging material in appropriate on-site bins for recycling.

.3 Separate for reuse and recycling and place in designated containers steel, metal and/or plastic waste.

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.6 Store metal in designated area for recycling.

.7 Disposal of asbestos waste generated by removal activities must comply with Federal, Provincial and Municipal regulations. Dispose of asbestos waste in sealed double thickness 6 mil bags or leak proof drums. Label containers with appropriate warning labels.

.8 Provide manifests describing and listing waste created. Transport containers by approved means to licenced landfill for burial.

1.9 EXISTING CONDITIONS

.1 Reports and information pertaining to ACMs that may be handled, removed, or otherwise disturbed and disposed of to complete the Work are bound into this specification in **Appendix A**.

.2 Notify Departmental Representative of suspected asbestos-containing material discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.10 SCHEDULING

.1 Hours of Work: refer to section 01 01 50 – General Instructions

1.11 OWNER'S INSTRUCTIONS

.1 Before beginning Work, provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of asbestos exposure, in personal hygiene and work practices, in use of glove bag procedures, and in use, cleaning, and disposal of respirators and protective clothing.

.2 Instruction and training related to respirators includes, at minimum:

.1 Fitting of equipment.

.2 Inspection and maintenance of equipment.

.3 Disinfecting of equipment.

.4 Limitations of equipment.

.3 Instruction and training must be provided by competent, qualified person.

Part 2 Products

2.1 MATERIALS

.1 Drop and Enclosure Sheets:

.1 Polyethylene: 0.15 mm thick.

.2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.

.2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in concentration to provide thorough wetting of asbestos containing material.

.3 Waste Containers: contain waste in two separate containers.

.1 Inner container: 0.15 mm thick sealable polyethylene bag or where glove bag method is used, glove bag itself.

.2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.

.3 Labelling requirements: affix preprinted cautionary asbestos warning, in both official languages, that is visible when ready for removal to disposal site.

.4 Glove bag:

.1 Acceptable materials: safe-T-Strip products in configuration suitable for Work, or Alternative material approved by addendum during tendering period in accordance with Instructions to Tenderers.

.2 The glove bag to be equipped with:

.1 Sleeves and gloves that are permanently sealed to the body of the bag to allow the worker to access and deal with the insulation and maintain a sealed enclosure throughout the work period.

.2 Valves or openings to allow insertion of a vacuum hose and the nozzle of a water sprayer while maintaining the seal to the pipe, duct or similar structure.

.3 A tool pouch with a drain.

.4 A seamless bottom and a means of sealing off the lower portion of the bag.

.5 A high strength double throw zipper and removable straps, if the bag is to be moved during the removal operation.

.5 Tape: tape suitable for sealing polyethylene to surfaces under both dry and wet conditions using amended water.

.6 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual asbestos fibres.

.1 Sealer: flame spread and smoke developed rating less than 50.

.7 Encapsulant: penetrating type conforming to CAN/CGSB-1.205.

Part 3 Execution

3.1 SUPERVISION

.1 Minimum of one Supervisor for every ten workers is required.

.2 Approved Supervisor must remain within Asbestos Work Area during disturbance, removal, or other handling of asbestos-containing materials.

3.2 PROCEDURES

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety.

.2 Before beginning Work, at each access to Asbestos Work Area, install warning signs in both official languages in upper case 'Helvetica Medium' letters reading as follows, where number in parentheses indicates font size to be used: 'CAUTION ASBESTOS HAZARD AREA (25 mm) / NO UNAUTHORIZED ENTRY (19 mm) / WEAR ASSIGNED PROTECTIVE EQUIPMENT (19 mm) / BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM (7 mm)'.

.3 Before beginning Work remove visible dust from surfaces in work area where dust is likely to be disturbed during course of work.

.1 Use HEPA vacuum or damp cloths where damp cleaning does not create hazard and is otherwise appropriate.

.2 Do not use compressed air to clean up or remove dust from any surface.

.4 Prevent spread of dust from Asbestos Work Area using measures appropriate to work to be done.

.1 Use FR polyethylene drop sheets over flooring such as carpeting that absorbs dust and over flooring in work areas where dust or contamination cannot otherwise be safely contained.

.5 Remove loose material by HEPA vacuum; thoroughly wet friable material containing asbestos to be removed or disturbed before and during Work unless wetting creates hazard or causes damage.

.1 Use garden reservoir type low - velocity sprayer or airless spray equipment capable of producing mist or fine spray.

.2 Perform Work in a manner to reduce dust creation to lowest levels practicable.

.6 Work is subject to visual inspection and air monitoring. Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.

.7 Cleanup:

.1 Frequently during Work and immediately after completion of work, clean up dust and asbestos containing waste using HEPA vacuum or by damp mopping.

.2 Place dust and asbestos containing waste in sealed dust tight waste bags. Treat drop sheets and disposable protective clothing as asbestos waste and wet and fold to contain dust and then place in waste bags.

.3 Immediately before their removal from Asbestos Work Area and disposal, clean each filled waste bag using damp cloths or HEPA vacuum and place in second clean waste bag.

.4 Seal and remove double bagged waste from site. Dispose of in accordance with requirements of Provincial and Federal authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and that guidelines and regulations for asbestos disposal are followed.

.5 Perform final thorough clean-up of Asbestos Work Areas and adjacent areas affected by Work using HEPA vacuum.

3.3 AIR MONITORING

.1 From beginning of Work until completion of cleaning operations, Departmental Representative to take air samples inside and outside of Asbestos Work Area enclosure in accordance with Provincial Occupational Health and Safety Regulations.

.1 Departmental Representative will be responsible for monitoring inside enclosure in accordance with applicable Provincial Occupational Health and Safety Regulations.

.2 If air monitoring shows that areas outside Asbestos Work Area enclosure are contaminated, enclose, maintain and clean these areas in same manner as that applicable to Asbestos Work Area, at no additional cost.

.3 Ensure that respiratory safety factors are not exceeded.

.4 During the course of Work, Departmental Representative to measure fibre content of air outside Work areas by means of air samples analyzed by Phase Contrast Microscopy (PCM).

.1 Stop Work when PCM measurements exceed 50% of the OEL (based on respiratory protection factor) inside work areas or when PCM measurements exceed 0.05 f/cc outside of work areas, and correct procedures.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 All labour, Material, services, and equipment necessary and incidental for the cast-in-place concrete as specified herein and indicated on the Drawings. All material and work specified in this Section shall be the responsibility of one contractor who will be held solely responsible for providing and co-ordinating all parts and installation.

1.2 DOCUMENTS

.1 This section of the Specifications forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

1.3 REFERENCE

.1 Do work in accordance with CAN/CSA-A23.1-09 and CAN/CSA A23.2-09, except where specified otherwise.

1.4 CERTIFICATES

.1 Provide certification that plant, equipment and materials to be used in concrete comply with the requirements of CAN/CSA-A23.1.

.2 Provide certification that mix proportions selected will produce concrete of specified quality and yield, and that strength will comply with CAN/CSA-A23.1.

1.5 QUALITY CONTROL

.1 Submit proposed quality control procedures for Departmental Representative's review.

1.6 SAMPLES AND PROTOTYPES

.1 Material samples: submit the following samples of materials for approval to the Departmental Representative. Approved samples shall be used as the acceptable standard for all materials used on the project.

.2 Forming materials,

.3 Gaskets, sealing materials, and form jointing system (as applicable).

.4 Form release agent.

Part 2 Products

2.1 MATERIALS

.1 Portland cement: Type GU and to CAN/CSA-A3000-08. No mixing of brands permitted.

.2 Water: to CAN/CSA-A23.1-09.

.3 Aggregates: to CAN/CSA-A23.1-09. Coarse aggregates to be normal density.

.4 Air entraining admixture: to CAN3-A266.1.

.5 Chemical admixtures: to CAN3-A266.2 and CAN/CSA S413-07. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.6 Super-plasticizer: to CAN3-A266.5 "Guidelines for the use of Super-plasticizing Admixtures in Concrete".

.7 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticising agents of pouring consistency, capable of developing a compressive strength of 50 MPa at 28 days.

.8 Concrete curing and sealing compound: Where slabs are to receive resilient flooring or carpeting, use curing compounds compatible with flooring adhesive. Do not use where bond required for additional concrete or surface coating. Acceptable products are as specified in Section 03 36 20.

.9 Bonding agent: formulated for bonding new concrete to cured concrete.

2.2 CONCRETE MIXES

.1 Design concrete mixes in accordance with CAN/CSA-A23.1 alternate 1, to give the properties shown in tabular form on structural drawings.

Part 3 Execution

3.1 GENERAL

.1 Do cast-in-place concrete work in accordance with CAN/CSA-A23.1.

3.2 WORKMANSHIP

.1 Obtain Departmental Representative's approval before placing concrete. Provide 24 hours' notice, minimum, prior to placing concrete.

.2 Pumping of concrete is permitted only after approval of equipment and mix design.

.3 Ensure reinforcement and inserts are not disturbed during concrete placement.

.4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing. Provide minimum of 7 day moist curing for all slabs.

.5 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.6 Do not place concrete over snow or ice.

.7 Follow cold weather concrete procedures in CAN/CSA A23.1 and as noted on the drawings.

.8 Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or plains of weakness. If a section cannot be placed continuously, construction joints shall be located as permitted by the Departmental Representative. All pour and construction joints shall be formed with a straight-edge fixed to formwork. Placing shall be carried out at such a rate that concrete which is being integrated with fresh concrete is still plastic.

.9 Compact concrete with high-frequency vibrators applied directly to concrete by experienced personnel. Do not over-vibrate.

.10 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Attach steel dowels of deformed steel reinforcing bars with Hilti RE 500 epoxy adhesive to the depths shown on the drawings or specified by the manufacturer.

.11 Take every precaution to protect finished surfaces from stains and abrasions. Surfaces and edges likely to be damaged during the construction period shall be especially protected.

.12 Do not place load upon new concrete until authorized by Departmental Representative.

3.3 INSERTS

.1 NO sleeves, ducts, pipes or other openings shall pass through joists, beams, slab bands, column capitals or columns, except where expressly detailed on structural drawings or approved by the Departmental Representative.

.2 Anchor bolts: Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.

3.4 TOLERANCES

.1 Concrete tolerances to be in accordance with CAN/CSA-A23.1.

3.5 PATCHING

.1 General:

.1 Areas to be repaired shall be determined by the Departmental Representative and shall not exceed 0.2 m^2 for each 100 m^2 of surface area, and shall be widely dispersed. Repairs shall match the surrounding area. Patching of slabs and concrete paving will not be accepted. Removal and replacement of work shall be at no additional cost.

.2 Before commencing any repair work, the Contractor shall confirm repair procedures with the Departmental Representative and establish the formula required by trial mix. The Contractor shall demonstrate his repair techniques on a prototype sample panel.

.2 Repair of cracks in concrete slabs and slabs-on-grade shall be the sole responsibility of the Contractor at no expense to the Departmental Representative to satisfy the installation and performance requirements of the floor finishes. This may include grinding off curled edges at slab cracks.

3.6 FINISHING

.1 Formed surface: The finishes to be provided for the various formed surfaces shall be:

.1 Unexposed Finish:

.1 This finish shall apply to formed surfaces which are not exposed to view and where roughness is not objectionable.

.2 The surface, in general, shall not require any treatment after form removal, other than repair of defective concrete, snap-tie holes, and the removal of ridges and surface irregularities.

.2 Unformed surface: The finish to be provided for the various unformed surfaces shall be:

.1 Final finishing shall be accomplished by mechanical floating, mechanical trowelling, creation of the specified surface finish, and tooling or edges and joints, in that order. Exposed edges and corners shall be as detailed. Surfaces at tooled edges shall be trowelled and sand-blasted to remove tool edge marks. Hand floating and trowelling shall only be permitted in small areas of restricted access. All final finishing procedures shall conform to the requirements of CAN/CSA-A23.1, Clause 7.

.2 Final finishing shall commence after bleed water has disappeared from the surface and when the concrete has stiffened sufficiently to prevent the working of excess water to the surface. No additional dry cement or water shall be used to facilitate finishing.

3.7 HOUSEKEEPING AND EQUIPMENT PADS

.1 Provide concrete pads and curbs under equipment where indicated on drawings and as specified in Division 26 and to approved shop drawings. Prepare base concrete with a rough scratch finish and use an approved bonding agent to bond concrete pad to base course. Dowel pads and curbs to base slab in accordance with details on the drawings.

3.8 QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory pre-approved by the Departmental Representative in accordance with CAN/CSA-A23.1. Non-destructive Methods for Testing Concrete shall be in accordance with CAN/CSA-A23.2.

.2 Contractor will pay for costs of tests.

.3 Testing Laboratory will take additional test cylinders during cold weather concreting.

Cure cylinders on job site under the same conditions as concrete which they represent.

.4 If results of tests show concrete to be less than specified in quality or strength, the Departmental Representative shall have the right to have the mix designs altered for the remainder of the work at no cost. Further testing and remedial measures required by CAN/CSA-A23.1 shall be done, the costs of this work paid for by the Contractor.

.5 Inspection or testing will not augment or replace Contractor quality control nor relieve him of his contractual responsibilities.

.6 Contractor to coordinate testing agency with concrete placement providing testing agency with sufficient time to provide personnel and equipment.

.7 Where field tests show that concrete is not within tolerance for slump and air, the truck shall be returned to the batch plant as soon as the results are obtained. The contractor shall not place concrete that has been shown not to meet the specifications.

.8 For additional information see Section 01 01 50 General Instructions.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Fire stopping and smoke seals within electrical assemblies (i.e. inside ducts) are specified in Division 26 respectively.

1.2 REFERENCES

.1 Underwriter's Laboratories of Canada (ULC)

.1 ULC-S115-1995, Fire Tests of Firestop Systems.

1.3 SAMPLES

.1 Submit samples in accordance with Section 01 01 50 – General Instructions.

.2 Submit duplicate 300 x 300 mm samples showing actual firestop material proposed for project.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

.2 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.

.3 Show location of all seals covered under this section including numbered index of seals and applicable underwriter's listing design.

1.5 PRODUCT DATA

.1 Submit product data in accordance with Section 01 01 50 – General Instructions.

.2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.

1.6 QUALIFICATIONS

.1 Manufacturer: Company specializing in manufacturing Products of this section with a minimum of three (3) years experience. Provide a manufacturer's direct technical representative to be on site during initial installation of fire stop systems to train personnel in proper selection and installation procedures. The technical representative shall carry out regular site inspections during the firestopping work to ensure that the installation is carried out in accordance with manufacturer's printed installation instructions and that deficiencies are corrected. Provide qualification documentation to the Departmental Representative when requested.

.2 Applicator: Approved, certified, licensed or otherwise qualified by the manufacturer of firestopping materials with a minimum of three (3) years proven experience.

.3 Product: Manufactured under a underwriter's follow-up program and bearing listing ULC or cUL label.

.4 Pre-Installation Conference: Convene a meeting between related sections following award of contract to discuss firestopping requirements. Ensure that other sections are aware of the maximum and minimum clearance requirements to the penetration stipulated by the underwriter's design listing.

.5 Equivalencies: For those firestop applications that exist for which no ULC or cUL tested system is available through a manufacturer, a manufacturer's engineering judgement derived from similar ULC or cUL system designs or other tests shall be submitted to local authorities having jurisdiction for their review and approval prior to installation.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

Part 2 Products

2.1 GENERAL

.1 General: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire resistance rated systems.

2.2 MATERIALS

.1 Firestopping Systems: Tested in accordance with ULC S-115 or CAN4-S115M, listed and certified by a third party testing agency, asbestos free, ULC or cUL labelled, and bearing the following rating:

.1 Firestop System Rating: In accordance with the National Building Code.

.2 Firestop system shall act as an effective smoke seal and have a flame spread rating less than 25.

.2 Service penetration assemblies: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.

.3 Service penetration firestop components: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40 U19.13 and ULC Guide No.40 U19.15 under the Label Service of ULC.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.5 The fire protection rating of installed firestopping assembly in a non rated floor or wall assembly shall not be less than twenty (20) minutes when tested in accordance with CAN4-S115M.

.6 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.8 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.9 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.10 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.11 Sealants for vertical joints: non-sagging.

Part 3 Execution

3.1 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.2 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to a neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.3 INSPECTION

.1 Notify Departmental Representative when ready for inspection and prior to concealing or enclosing firestopping materials and service penetration assemblies.

3.4 SCHEDULE

.1 Firestop and smoke seal at:

.1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.

.2 Edge of floor slabs at exterior walls.

.3 Top of fire-resistance rated masonry and gypsum board partitions.

.4 Intersection of fire-resistance rated masonry and gypsum board partitions.

.5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.

.6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.

.7 Openings and sleeves installed for future use through fire separations.

3.5 CLEAN UP

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 07 84 00 – Fire Stopping

1.2 REFERENCES

.1 Definitions:

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

.2 Reference Standards:

.1 CSA Group

.1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

.2 CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)

.1 EEMAC 2Y-1-1958, Light Gray Colour for Indoor Switch Gear

.3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 01 50 – General Instructions.

.2 Submit for review single line electrical diagrams and locate under plexiglass in.

.1 Electrical distribution system in main electrical room.

.2 Electrical distribution systems in outdoor unit substation.

.3 Shop drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of British Columbia, Canada.

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 Submit electrical drawings to the local electrical inspection authorities.

.6 If changes are required, notify the Departmental Representative of these changes before they are made.

.4 Certificates:

.1 Provide CSA certified equipment and materials.

.2 Where CSA certified equipment and material is not available, submit such equipment and materials to special inspection authorities for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.

.6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to the Departmental Representative.

.5 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 01 50 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data and incorporate into manual specified in Section 01 01 50 – General Instructions.

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Deliver and handle in accordance with Section 01 01 50 – General Instructions. Store materials in accordance with section 01 01 50 or manufacturer's recommendations in clean dry, well-ventilated area; whichever requirement is more stringent.

.2 Store and protect finished materials and equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates and labels for control items in English.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 01 50 – General Instructions.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment is not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory-assemble control panels and component assemblies.

2.3 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of inspection authorities.

.2 Decal signs, minimum size 175 x 250 mm.

2.4 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.5 EQUIPMENT IDENTIFICATION

.1 Identify all electrical equipment (including each feeder breakers at MDC, panelboards, disconnect switches, etc.) with nameplates and labels as follows:

.1 Nameplates: lamicoid 3 mm thick plastic engraving sheet, black or matt white finish face, black or white core, lettering accurately aligned and engraved into core and mechanically attached with self-tapping screws.

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate label.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Identify equipment with Size 3 labels engraved as noted. Equipment designations to reference equipment schedule references.

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

.10 Provide neatly typed circuit directories in panelboards to indicate area or equipment controlled by each branch circuit.

.11 Receptacles: lamacoids mounted to device plate to indicate panel and circuit number and voltage.

.12 Cables: cable labels for all devices. Identify circuit numbers, location, and origin at both ends of cables.

.13 Pull boxes, junction boxes, conduits: provide purpose-manufactured, durable, and clearly legible markings to identify the function and voltage of the system.

2.6 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible cable labels, numbered, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.7 CONDUIT AND CABLE IDENTIFICATION

.1 Provide slip-on plaster ID for wiring inside panelboards, control cabinets or tub and starter panels, etc.

.2 Colour code conduits, boxes and metallic sheathed cables.

.3 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

.4 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour.

Prime	Auxiliary	
up to 250 V	Yellow	
up to 600 V	Yellow	Green
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue

2.8 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint outdoor electrical equipment "equipment green" finish to Munsell 7GY3.29/1.5 green (STD).

.2 Paint indoor switchgear and distribution enclosures light gray to EEMCA 2Y-1.

Part 3 Execution

3.1 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

3.2 COORDINATION WITH CONTRACTORS PERFORMING WORK FOR OTHER CONTRACTS

.1 There will be another contractor on site, working in parallel, to perform electrical works under a different contract in building 106. Perform role of Prime Contractor for all work

3m away from building foundation and be responsible for the health and safety program (per WorkSafe BC) of the construction site while these other contractors/trades are working within the limits of this contract.

3.3 COORDINATION WITH OTHER DIVISIONS

.1 The Trade Contractor shall:

.1 Examine the drawings and specifications of all divisions and become fully familiar with their work.

.2 Lay out the work and equipment with due regard to architectural, structural, civil, mechanical, and process features.

.3 Coordinate with all Divisions installing equipment and services, and ensure that there are no conflicts.

.4 Install anchors, bolts, pipe sleeves, hanger inserts, etc. in ample time to prevent delays.

3.4 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.5 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.

.1 Sleeves through concrete: schedule 40 steel pipes, sized for free passage of conduit, and protruding 50 mm.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

.4 Provide sleeves of galvanized steel pipe with machine cut ends of ample size to accommodate conduits passing through walls, partitions, ceilings, floors, etc.

.1 For wall, partitions and ceilings, the end shall be flush with the finish on both sides but for floors they shall extend 50 mm above finished floor level.

.2 The space between the sleeves and the conduit shall be filled with ULC listed fire stopping and caulked around the top and bottom with approved permanently resilient, non-flammable and weatherproof silicone base compound and ensure that the seal is compatible with the floor and ceiling finishes. Refer to Section 07 84 00 – Fire Stopping for details.

.5 Maintain separation between electrical wiring system and building piping, ductwork, etc. so that wiring system is isolated (except at approved connections to such systems) to prevent galvanic corrosions.

.1 In particular, contact between dissimilar metals, such as copper and aluminum is not permitted.

3.6 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

3.7 SEALING OF WALL AND FLOOR OPENINGS

.1 All conduit and cable entries through outside walls of building, through partition walls separating electrical rooms from other areas, through fire separations, and through floors above grade shall be sealed to prevent passage of moisture, water, dust, gasses, flame, or to maintain pressurization.

.2 Openings shall be sealed when all wiring entries have been completed.

.3 Sealing material shall be fire resistant and shall not contain any compounds which will chemically affect the wiring jacket or insulating material. Cable penetrations through fire separations shall be sealed. Cable penetrations through retaining wall shall be watertight.

.4 Fire stopping shall be applied by factory trained specialist, provide evidence of certification.

3.8 PROTECTION OF OPENINGS

.1 Protect equipment and system openings from dirt, dust, and other foreign materials with materials appropriate to system.

3.9 CO-ORDINATION OF PROTECTIVE DEVICES, STATION GROUNDING & STEP TOUCH POTENTIAL

.1 Submit coordination study for the power distribution system. The report shall be signed and sealed by a Professional Engineer registered with the Province of British Columbia, Canada.

.2 Prior to testing and commissioning, check and calibrate circuit protective devices such as overcurrent trips, relays, and fuses are installed to require values and settings. Submit commissioning report signed and sealed by a Professional Engineer registered in the Province of British Columbia, Canada.

.3 Provide Arc Flash Hazard Study for the complete distribution systems including the equipment product data of 15KV and 120/208V distribution panels in accordance with CEC Section 2-306. The study shall be carried out by an approved agency located in Vancouver Island, British Columbia, submit the complete report signed and sealed by a P.Eng registered in the Province of British Columbia. Provide an Arc Flash warning sticker, made with UV resistant ink, indicating arc flash (incident energy) and shock protection information for every piece of equipment modified as part of the new power distribution system.

.4 Provide station grounding and step & touch potential study and commissioning report for primary equipment installation such as primary switch and padmount transformer.

3.10 SEISMIC RESTRAINT

.1 Seismic restraint in accordance with third-party Seismic Engineer's recommendations.

3.11 FIELD QUALITY CONTROL

.1 Load Balance:

- .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
- .3 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS: phase and neutral currents on panelboards, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests in accordance with Section 01 01 50 – General Instructions.

- .1 Power distribution system including phasing, voltage, grounding and load balancing.
- .2 Circuits originating from branch distribution panels.
- .3 Insulation resistance testing:
  - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
  - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
  - .3 Check resistance to ground before energizing.
  - .4 **Non-destructive** testing for feeders in 15kV class

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.4 Manufacturer's Field Services:

- .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .3 Schedule site visits, to review Work, as directed in PART 1 – QUALITY ASSURANCE.

3.12 COMMISSIONING

.1 Provide complete commissioning of all equipment and systems specified in Division 26 and other related Sections as part of this project.

.2 Comply with the requirements of the following Sections:

.1 Section 01 91 31 – Commissioning Requirements

3.13 DEMONSTRATION AND TRAINING

.1 Provide demonstration and training for all equipment and systems specified in Division 26

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.14 TESTING

.1 Requirements for testing of equipment, materials and systems are listed in individual specification Sections.

3.15 PERMIT AND INSPECTION

.1 Submit to the local Electrical Inspection Department necessary number of drawings for examination and approval prior to commencement of work.

.2 Obtain an electrical work permit and pay all associated fees. Submit documentation to the Departmental Representative for record.

.3 Notify the Departmental Representative of changes required by the Electrical Inspection department prior to making changes.

.4 Furnish Certificates of Acceptance from Electrical Inspection Department jurisdiction on completion of work to Departmental Representative.

3.16 CLEANING

.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.2 Clean and prime exposed non-galvanized hangers, racks, and fastenings to prevent resuting.

END OF SECTION

Approved: 2008-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 - Common Work Results for Electrical

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-C22.2 No. 131-07, Type TECK 90 Cable.

.2 CSA-C68.3-97(R2006), Shielded and Concentric Neutral Power Cables.

.3 CSA-C233.1-87(R2004), Gapless Metal Oxide Surge Arresters for Alternating Current Systems.

.2 National Electrical Manufacturers' Association (NEMA)/Insulated Cable Engineers Association (ICEA)

.1 NEMA WC3-1992/ICEA S-19-81, Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

.2 NEMA WC7-1992/ICEA S-66-524, Cross-Linked Polyethylene Wire and Cable for Transmission and Distribution.

.3 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

.1 ANSI/IEEE C62.36-2000, Standard Test Methods for Surge Protectors Used in Low Voltage Data, Communications and Signalling Circuits.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 01 50 – General Instructions.

.2 Provide product data in accordance with Section 01 01 50 – General Instructions.

.1 Provide manufacturer's printed product literature, specifications, data sheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse or recycling in accordance with Section 01 01 50 – General Instructions.

Part 2 Products

2.1 CONCENTRIC NEUTRAL POWER CABLES (5001 - 15000 V)

.1 Concentric neutral power cable: to NEMA WC7-1992/ICEAS-66-524, AEIC CS5, ICEA S-66-524 and CSA-C68.3.

.2 Single copper conductor, size as indicated.

.3 Semi-conducting strand shield.

.4 Class 2 compact round stranding per ASTM B4596:

.1 All strand interstices to be filled during stranding operation and each wire and successive layers of wires to be sealed with approved sealing compound.

.2 Acceptable products: Canada Wire "STRAND BLOCK"; Pirelli "STRANDSEAL."

.5 Insulation: tree-retardant cross-linked thermo-setting polyethylene (TR-XLPE) rated 90°C and 15 kV for 100 % voltage level.

.6 Semi-conducting insulation shielding layer.

.7 Copper neutral wires applied helically over insulation shield equivalent to 100 % full capacity.

.8 Separator tape over neutral wires.

.9 Insulation shield of semi-conducting thermo-setting XLPE applies as a co-extrusion with the insulation and the conductor shield.

.1 Semi-conducting insulation shield to be marked with words "SEMI-CONDUCTING – REMOVE WHEN SPLICING OR TERMINATING."

.10 Jacket, encapsulating linear low density polythethylene.

.11 Acceptable manufacturers: Canada Wire, Pirelli, Phillips.

2.2 DEAD BREAK BUSHING WELL INSERT

.1 Dead break bushing inserts 15 kV, 95 kV BIL, as indicated, consisting of:

.1 Arc snuffer.

.2 Female contact, tin-plated copper.

.3 Housing, moulded EDPM compound.

.4 Connector replaceable contact, copper.

.5 Lock ring.

.6 Grounding eye.

.7 Acceptable manufacturers: Elastimold, RTE Corp., ITT Blackburn, Hubbell, Cooper.

2.3 DEAB BREAK ELBOW CONNECTORS

.1 Dead break elbow connectors 200 A, 15 kV, 95 kV BIL, as indicated, consisting of:

.1 Arc follower.

.2 Male contact, tin-plated copper.

.3 Elbow connector housing, moulded EDPM compound.

.4 Conductor contact, copper crimp type.

.5 Voltage test point with hot stick removable cap.

.6 Grounding eye moulded in elbow housing.

.7 Moulded stress relief in elbow housing.

.8 Moulded outer jacket conductive shield.

.9 Acceptable manufacturers: Elastimold, RTE Corp., ITT Blackburn, Hubbell.

2.4 CABLE TERMINATORS

.1 Single piece outdoor cable slip-on terminator 15 kV, 95 kV BIL for 7.2k/12.5kV and for 15 kV primary system, consisting of:

.1 External insulation – high strength, wet process porcelain, deep draw corrugated skirts, gasket sealed to body of terminator.

.2 Body – cast aluminum complete with plastic threaded vent plug.

.3 Stress relief control device.

.4 Internal insulating material (Novoid 254) factory filled to provide a void-free environment for cable end.

.5 Cable centering plug.

.6 Sealing system – gasketed hood on top of terminator, sealing bolts, silicone rubber diaphragm at cable entrance. Bolted aluminum sealing plate on bottom.

.7 Copper compression connector to terminate connector.

.8 Aerial lug – eyebolt style.

.9 Cross arm mounting bracket complete with ground connection stud.

2.5 DEAD BREAK JUNCTION

.1 Four-point dead-break junctions 200 A 15 kV, 5 kV BIL consisting of:

.1 Junction housing of EDPM compounds.

.2 Internal solid copper bus bar.

.3 Contact assembly identical to load-break bushing insert.

.4 Insulated protective cap matching the interface.

.5 Moulded outer conductive shield jacket of conducting EDPM.

.6 Back plate.

.7 Mounting bracket.

.8 Grounding lug.

.9 Parking stands.

.10 Two (2) stand-off bushings.

.11 Four (4) dead-end receptacles.

.2 Acceptable manufacturers: Elastimold, RTE Corp., ITT Blackburn, Hubbell

Part 3 Execution

3.1 INSTALLATION

.1 Install concentrate neutral power cables in ductbank and conduit.

.2 Install power cable in ducts and manholes as indicated and in accordance with manufacturer's instructions.

.3 Provide supports and accessories for installation of high voltage power cable.

.4 Install stress cones, terminations and splices in accordance with manufacturer's instructions

.5 Install grounding in accordance with local inspection authority having jurisdiction.

.6 Provide cable identification tags and identify each phase conductor of power cable.

.7 Terminate cables with elbow connectors or cable terminators as indicated and where necessary to complete the primary distribution system. Install all cable terminations to the manufacturers' specifications and instructions.

.8 Install cable dead break junctions to each phase of a three-phase system in primary switch enclosure as indicated.

.9 Install matching dead end receptacle cap to all spare junction bushings.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Use of qualified tradespersons for installation, splicing, termination and testing of high voltage power cables.

.3 Engage an independent testing agent to test high voltage power cable. Submit test result and inspection certificate.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section specifies the requirements for commissioning of the electrical systems and equipment installations.

.2 Coordinate related commissioning with other divisions.

.3 Coordinate the Work in this section with Section 01 91 13 - Commissioning Requirements.

.4 Perform on site verification, tests and commissioning in accordance with:

.1 The Contract Documents.

.2 Manufacturer's published instructions.

.3 Applicable CSA, ULC, IEEE, IPCEA, EEMAC, ANSI, NETA, and ASTM standards.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-C22.2 No.0.4., Bonding of Electrical Equipment

.2 CSA-C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations, amendment as adopted by the Province of British Columbia and the respective electrical safety bulletins issued by British Columbia Safety Services.

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S536-04, Inspection and Testing of Fire Alarm Systems.

.2 CAN/ULC-S537-04, Verification of Fire Alarm Systems.

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 01 50 – General Instructions.

.2 Submit all information and data in both printed paper format and PDF electronic format. The PDF electronic format will be used for insertion into the Building Interactive Electronic Operating and Maintenance and Commissioning Manuals. Develop a full start-up and initial checkout plan using manufacturer's start-up procedures.

.3 Develop and submit Verification/Static Forms and Prefunctional Checklists and Functional/Dynamic Forms and Functional Test Procedures for all electrical equipment and systems in both printed paper format and PDF electronic format. The PDF electronic format will be used for insertion into the Building Interactive Electronic Operating and Maintenance and Commissioning Manuals.

.4 Closeout Submittals:

.1 Submit completed and signed forms, checklists and test results after completion of commissioning for incorporation into manuals specified in Section 01 01 50 – General Instructions and Section 01 91 13 – Commissioning Requirements.

1.4 GENERAL

.1 Be responsible for the performance and commissioning of all equipment supplied under the Sections of the Divisions.

.2 Commissioning is the process of advancing the installation from the stage of static completion to full working order in accordance with the contract documents and design intent. It is the activation of the completed installation.

.3 In consultation with the General Contractor, ensure that sufficient time is allowed and fully identified on the construction schedule for the proper commissioning of all electrical systems.

.4 Commissioning of the electrical systems shall be in accordance with the Code of Practice and industry standards for Commissioning Electrical Systems in Industrial Facilities and as described in this section.

.5 The commissioning process shall be applied to all shop move equipment and systems provided under this Division.

1.5 ELECTRICAL COMMISSIONING AGENCY

.1 Retain services of independent Electrical Commissioning Agency with demonstrated minimum 10 years of experience in commissioning of electrical systems and equipment such as those required on this project.

.2 This agency will be responsible for participation in commissioning process and providing required commissioning services specified in the contract documents.

.3 Electrical Commissioning Agency shall prepare Verification/Static Forms and Prefunctional Checklists and Functional/Dynamic Forms and Functional Test Procedures.

.4 Provide or coordinate demonstration and instruction to Owner's staff to enable them to become familiar with the equipment and systems.

1.6 RESPONSIBILITIES

.1 The commissioning responsibilities applicable to each of the subcontractors, suppliers, commissioning agency and other affected parties of the Divisions are as follows (all references apply to commissioned equipment and systems only):

Construction and Acceptance Phases

.1 Include and itemize the cost of commissioning in the contract price.

.2 In each purchase order or subcontract written, include requirements for submittal data, commissioning documentation, O&M data and training.

.3 Attend a commissioning scoping meeting and other meetings necessary to facilitate the Cx process.

.4 Contractors shall provide the Commissioning Agent (CA) with normal cut sheets and shop drawing submittals of commissioned equipment in both digital and paper media.

.5 Provide additional requested documentation, prior to normal O&M manual submittals, to the CA for development of start-up and functional testing procedures.

a. Typically this will include detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any owner-contracted tests, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CA.

b. The CA may request further documentation necessary for the commissioning process.

c. This data request may be made prior to normal submittals.

.6 Provide a copy of the O&M manuals and submittals of commissioned equipment, through normal channels, to the CA for review and comment.

.7 Contractors shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.

.8 Prepare and provide to the CA commissioning forms including Verification/Static Forms, Prefunctional Checklists, Functional/Dynamic Forms, and Functional Performance Test Procedures as specified. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.

.9 Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the verification/static forms and prefunctional checklists for all commissioned equipment and systems. Submit to CA for review and comment prior to startup. Refer to Section 01 91 13– Commissioning Requirements for further details on start-up plan preparation.

.10 During the startup and initial checkout process, execute Verification/Static Forms and the prefunctional checklists for all commissioned equipment and systems for the work covered under the above listed Divisions.

.11 Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the CA.

.12 Address current punch list items before functional testing.

.13 Provide skilled technicians to execute Functional/Dynamic Forms and the functional performance tests and starting of equipment. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.

.14 Provide skilled technicians to perform functional performance testing under the direction of the CA for specified equipment and systems in respective sections and Section 01 91 13 – Commissioning Requirements. Assist the CA in interpreting the monitoring data, as necessary.

.15 Correct deficiencies (differences between specified and observed performance) as interpreted by the CA, Departmental Representative and Design Consultant and retest the equipment.

.16 Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.

.17 During construction, maintain as-built red-line drawings for all drawings. Update after completion of commissioning (excluding deferred testing).

.18 Provide training of the Owner's operating staff using expert qualified personnel, as specified.

.19 Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

Warranty Period

.1 Execute seasonal or deferred functional performance testing, witnessed by the CA, according to the specifications.

.2 Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

1.7 COMMISSIONING AND DEMONSTRATION

.1 Provide the services of an approved independent specialist firm to coordinate the commissioning process specified under this division and those items of other Divisions which interact with work of this Division as outlined herein.

.2 Coordinate work with commissioning specified in Division 1.

.3 The cooperation of all trades is essential for an efficient and planned process. A team comprising the following is recommended:

.1 Electrical Commissioning Coordinator.

.2 General Contractor.

.3 Electrical Contractor's Supervisor.

.4 Other Division's Trades and Suppliers.

.4 Prepare a commissioning statement for each of the four (4) phases that the process is perceived to be worked through. In sequence, the phases are expected to be:

.1 PHASE 1 - System readiness.

.2 PHASE 2 - System start-up, testing, balancing, etc.

.3 PHASE 3 - Verification of system performance.

.4 PHASE 4 - Demonstration & instruction.

.5 Each phase is applicable to each major and/or separate system making up the work in each Division.

.6 Regular meetings shall be held during the commissioning process. Minutes of the meetings shall be issued to all contractors involved, the Departmental Representative and the Owners representative.

.7 Plan the work to be specific in respect of personnel, schedule, review and laboratory tests.

.1 Personnel: Assign direct overall charge of commissioning to a person (the commissioning coordinator) fully qualified through practical experience and a comprehensive knowledge of the interactive nature of building and process systems and their controls to understand the complete system and be available to carry the project through to total completion. This person shall be responsible for: Commissioning, Demonstration to the Departmental Representative and Owner and Certifications of Substantial Completion.

.2 Schedule: Submit a Cx schedule to synchronize with the construction schedule, as part of the construction schedules, for the commissioning phase of the work. This schedule shall show:

.1 Equipment start-up schedule.

.2 Submission dates for the various documents required prior to substantial completion.

.3 Timing of the various phases of the commissioning, testing, balancing and demonstration process.

.3 Review: Within two (2) months of commencing with the project work, the person having direct overall charge of commissioning shall review design intent and intended commissioning procedures with the Departmental Representative. Within three (3) months of commencing with the project, submit a detailed plan that addresses the entire approach to the commissioning process. The plan should be prepared specifically for the project at hand. The plan should include the following components:

.1 Name and qualifications of the commissioning coordinator.

.2 Itemized check lists for the readiness, start-up and operational verification of all equipment and systems.

.3 Outline of proposed method of notification and correction of interim operational deficiencies.

.4 Outline of proposed demonstration and operator training program.

.4 Troubleshooting: Where problems become apparent during the commissioning process, work at the identification and resolution of these problems. The basic functions in trouble shooting are:

.1 What - Identification and definition of the problem.

.2 Why - Determination and evaluation of the causes.

.3 When - Determine the time available to resolve the problem.

.4 Involve the Departmental Representative in the review of the problem and proposed resolution.

.5 Co-ordinate remedial action with the appropriate parties.

.6 Evaluate the effectiveness of the remedial action.

.5 Laboratory Tests: If the field tests indicate that equipment supplied to the project does not meet specifications, laboratory certification of the potentially deficient equipment may be requested by the Departmental Representative. In the event that equipment does not meet specifications, contractor shall be responsible for the costs of:

.1 The above laboratory tests, and

.2 All subsequent testing and correction required.

.8 The work included in each of the four phases shall be generally as follows:

.1 **PHASE 1** System Readiness

.1 Before starting any of the separate systems, provide written verification stating that the specific system is ready for start-up and the following conditions have been met:

.1 All safety controls installed and fully operational (dry run test).

.2 Qualified personnel available to operate the plant.

.3 Permanent electrical connections made to all equipment in accordance with CSA C22.1.

.2 System readiness shall include, but not necessarily be limited to the following:

.1 Checking system physical completion, including insulation resistant tests, continuity test, phase rotations, all controls and instrumentation.

.2 Copies of all test and certificates (site testing reports, manufacturer's production test records, and provincial electrical inspector final inspection certificate) have been submitted to the Departmental Representative.

.3 All controls and safety interlocks installed and fully operational (dry run test).

.4 All cleaning is complete.

.5 Pre-start checks are complete.

.6 All equipment and tools necessary to perform testing, adjusting and balancing as required.

.7 Vibration isolation and seismic restraints completed.

.8 All cabling and wiring are completed and labelled.

.9 Control functional checks, including completing all interconnection wiring, alarms, and interlocks are performed.

.10 Start-up verification checks by manufacturer's representatives completed.

.11 All deficiencies to be recorded, reviewed by the commissioning team and, subsequently corrected before proceeding to the next phase, PHASE 2.

.2 **PHASE 2** System startup, testing, balancing

.1 System Commissioning shall include but not necessarily be limited to:

.1 Activation of all systems and installation.

.2 Testing and adjustment of all systems.

.3 All deficiencies are to be recorded, reviewed by the commissioning team and, subsequently, corrected. The process at the point of the deficiency, shall be repeated before proceeding to PHASE 3.

.2 Phase 2 is concluded when the installation is in full working order and acceptable for use. The work will include the following:

.1 Testing of equipment operation.

.2 Insulation resistance testing for all power and control wiring.

.3 Step and touch potential.

.4 Station grounding testing.

.5 Ground resistance test to CSA C22.2 No.0.4.

.6 Load balance testing.

.7 Thermographic testing of all connections/terminations.

.8 Power factor testing.

.9 Voltage testing and adjustment.

.10 Verification and testing of the fire alarm system to CAN/ULC-s536 and s537.

.11 Fine Tuning/calibration:

.1 Load balancing at panelboard.

.2 Correct power factor.

.3 Re-calibrate circuit breakers tripping.

.4 Adjust transformer tapping for nominal service voltage.

.12 Testing:

.1 A detailed check by a person having direct overall charge of commissioning. This check to include all items and functions to be later demonstrated to the Departmental Representative and Owner's representatives.

.3 **PHASE 3** Verification of Commissioning:

.1 Verification of system performance by the Departmental Representative will not commence until PHASE 2 has been totally completed. Submit test procedure completion test certificates at the time of requesting the commencement of the verification procedure. The verification process will include the demonstration of the following:

.1 Power Distribution Systems and outlets

.1 Primary switchgears and pad mounted transformer

.2 Panelboards

.3 Feeders, conductors and branch circuit wiring

.4 Feeder Breakers

.5 Grounding & Bonding

.6 Feeder Cables

.2 Fire Alarm System

.2 At the completion of Phase 3, the Contractor shall submit the following to the Departmental Representative:

.1 A letter certifying that all work specified under this contract is complete, clean and operational in accordance with the specification and drawings.

.2 A commissioning report which should include completed copies of all Phase 2 documentation outlined in the commissioning plan plus copies of start-up reports from specialty contractors and vendors and any other relevant information for inclusion in the operating & maintenance manuals.

.3 Complete fire alarm verification report to CAN/ULC-s537.

.4 Record drawings as specified, update to include changes resulting from commissioning.

.5 Identification of equipment and systems complete.

.4 PHASE 4 Demonstration and Acceptance

.1 Demonstration and acceptance shall not commence until the commissioning process PHASE 3 has been successfully completed.

.2 The Demonstration process is a planned process requiring a preplan approval before commencement and a signed statement of satisfaction from the Departmental Representative upon completion.

.3 For Demonstration and instruction to Operating staff requirements, refer to this section of the specification and also to Section 01 91 41 - Demonstration and Training.

.4 Fire Safety Systems operation in the fire mode shall be demonstrated to the Departmental Representative. Obtain a written statement/certificate of approval.

.5 Post Substantial Performance Visits

.1 Provide follow-up visits to the site at one month, two months and six month after substantial performance for a minimum period of two days, to ensure that the systems are operating correctly and that they are being operated and maintained properly.

.2 Submit a report to the Departmental Representative and Owner which documents any problems that have arisen and correction action required.

1.8 VERIFICATION/STATIC FORMS AND PREFUNCTIONAL CHECKLISTS

.1 Produce Verification/Static Forms and Prefunctional Checklists.

The forms and checklists shall contain items for Electrical contractors to perform. On each form and checklist, provide a column that should be filled out by the Contractor assigning responsibility for that line item to a trade. Those executing the forms and checklists are only responsible to perform items that apply to the specific application at hand. These forms and checklists do not take the place of the manufacturer's recommended checkout and start-up procedures or report. Some forms and checklists procedures may be redundant of some checkout procedures that will be documented on typical factory field checkout sheets. Double documenting is required in those cases.

Refer to Section 01 91 13 – Commissioning Requirements for requirements regarding verification/static forms and prefunctional checklists, startup and initial checkout. Develop Verification/Static Forms and Prefunctional Checklists for each item, equipment and system.

Contractors assigned responsibility for sections of the form and checklist shall be responsible to see that form and checklist items by their subcontractors are completed and checked off. "Contr." column or abbreviations in brackets to the right of an item refer to the contractor responsible to verify completion of this item. All = all contractors, CA = commissioning agent, CC = controls contractor (s) (EMCS and Plant Control System (PCS)), DC = Design Consultant, EC = electrical contractor, GC = general contractor, MC = mechanical contractor, SC = sheet metal contractor.

1.9 FUNCTIONAL/DYNAMIC FORMS AND FUNCTIONAL TESTING PROCEDURES

.1 Produce the Functional/Dynamic forms and Functional Testing procedures. Use the functional/dynamic and functional testing requirements in applicable sections and the testing protocols specified in Section 01 91 13 – Commissioning Requirements for developing site-specific functional/dynamic forms and functional test procedures and forms for this project.

Develop Functional/Dynamic Forms and Functional Testing procedure and carry of functional testing as required.

1.10 VERIFICATION/STATIC FORMS & PREFUNCTIONAL CHECKLISTS AND FUNCTIONAL/DYNAMIC FORMS & FUNCTIONAL TESTING PROCEDURES: REQUIREMENTS

.1 Verification/Static forms and Prefunctional Checklists and Functional/Dynamic forms and Functional Testing Procedures are required for the following:

.1 Fire alarm Systems

.2 Power Systems

a. Primary Switchgear

b. Power transformer

c. Secondary power distribution centers

d. Secondary power distribution panelboards

e. Panelboards

f. Primary grounding and secondary grounding including station grounding test, step and touch potential for primary equipment installation.

g. Bonding

h. Metering and instrument

i. Control systems

.3 Seismic restraint

.4 Electrical identification system for equipment and systems

.2 Install and test all controls prior to commissioning.

.3 Ensure that the commissioning provides for the full and comprehensive operation of the equipment under all anticipated normal and adverse operating conditions.

.4 An Acceptance Meeting must be held at the end of the twenty-eight (28) day test to confirm the status of the System.

.5 Suggested Numbering Key for Commissioning Procedures:

The checklists, functional tests, documentation and training use the following identification numbering:

At the beginning of the identification number is a text abbreviation for the following:

Document or Event Abbreviations

DOC = Documentation

PC	=	Prefunctional Checklist
SP	=	Startup Plan
SR	=	Startup Report
FPT	=	Functional Performance Test
R	=	Review
TR	=	Training Record

Part 2 Products

2.1 TEST EQUIPMENT

.1 Subcontractors, suppliers, commissioning coordinator and other affected parties of the Divisions shall provide all test equipment necessary to fulfill the testing requirements as specified.

Part 3 Execution

3.1 SUBMITTALS

.1 Provide submittal documentation relative to commissioning as required in Part 1, Section 01 91 13 – Commissioning Requirements.

3.2 STARTUP

.1 The subcontractors, suppliers, commissioning agencies and other affected parties of the Divisions shall follow the start-up and initial checkout procedures listed in 1.8 Prefunctional Checklists, 1.5 Responsibilities and in Section 01 91 13 – Commissioning Requirements. Responsibilities include start-up and complete systems and sub-systems that are fully functional, meeting the design objectives of the Contract Documents. The commissioning procedures and functional testing do not relieve or lessen this responsibility or shift that responsibility partially to the CA or the Departmental Representative.

.2 Functional testing is intended to begin upon completion of a system. Functional testing may proceed prior to the completion of systems or sub-systems at the discretion of the CA and Departmental Representative. Beginning system testing before full completion, does not relieve the Contractor from fully completing the system, including all verification/static forms and prefunctional checklists as soon as possible.

3.3 VERIFICATION/STATIC FORMS AND PREFUNCTIONAL CHECKLISTS

.1 Refer to 1.5 and 1.7 for specific details on the required verification/static forms and prefunctional checklists.

3.4 FUNCTIONAL/DYNAMIC FORMS AND FUNCTIONAL PERFORMANCE TESTS

.1 Refer to 1.6 and 1.7 for specific details on the required functional/dynamic forms and functional performance tests.

3.5 TESTING DOCUMENTATION, NON-CONFORMANCE AND APPROVALS

.1 Refer to Section 01 91 13 – Commissioning Requirements for specific details on non-conformance issues relating to verification/static forms and prefunctional checklists and functional/dynamic forms and functional performance tests.

3.6 OPERATION AND MAINTENANCE (O&M) MANUALS

.1 The following O&M manual requirements do not replace O&M manual documentation requirements elsewhere in these specifications.

.2 Compile and prepare documentation for all equipment and systems covered in the Divisions and deliver this documentation to the Contractor for inclusion in the O&M Manuals, according to this section and individual technical sections, prior to the training of owner personnel.

.3 The CA shall receive a copy of the O&M manuals for review.

.4 Special Control System O&M Manual Requirements. In addition to documentation that may be specified elsewhere, the controls contractor(s) shall compile and organize at minimum the following data on the control system in labelled 3-ring binders with indexed tabs.

.1 Three copies of the controls training manuals in a separate manual from the O&M Manuals.

.2 Operation and Maintenance Manuals containing:

a. Specific instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. These instructions shall be step-by-step. Indexes and clear tables of contents shall be included. The detailed technical manual for programming and customizing control loops and algorithms shall be included.

b. Full as-built set of control drawings (refer to Submittal section above for details).

c. Full as-built sequence of operations for each piece of equipment.

d. Full print out of all schedules and set points after testing and acceptance of the system.

e. Full as-built print out of software program.

f. Electronic copy on USB Flash Drive of the entire program for this facility.

g. Marking of all system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.

h. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.

i. Control equipment component submittals, parts lists, etc.

j. Warranty requirements.

k. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).

.3 The manual shall be organized and subdivided with permanently labelled tabs for each of the following data in the given order:

a. System description

b. Sequences of operation

c. Control drawings and schematic diagram

d. Program setups (software program printouts)

.4 Field checkout sheets and trend logs should be provided to the CA for inclusion in the Commissioning Record Book.

.5 Special Documentation Requirements. The CA will compile and submit the following with other documentation that may be specified elsewhere in the *Specifications*.

.1 Final report containing an explanation of the methodology, assumptions, test conditions and the results in a clear format with designations of all uncommon abbreviations and column headings.

.2 The CA shall mark on the drawings where all critical measurements were taken and cross reference the location in the report.

.6 Review and Approvals. Review of the commissioning related sections of the O&M manuals shall be made by the Design Consultant and the CA. Refer to Section 01 91 13 - Commissioning Requirements for details.

3.7 TRAINING OF OWNER PERSONNEL

.1 The Contractor shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed. Refer to Section 01 91 13 – Commissioning Requirements for additional details.

.2 The CA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment and systems. Refer to Section 01 91 13 - Commissioning Requirements for additional details.

.3 Electrical

.1 Provide the CA with a training plan two weeks before the planned training according to the outline described in Section 01 91 13 – Commissioning Requirements.

.2 Provide designated Owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment and system.

.3 Training shall normally start with classroom sessions followed by hands-on training on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, power failure, etc.

.4 During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.

.5 The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up

technician for the piece of equipment, the installing contractor or supplier's/manufacturer's technical supports representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment is required. More than one party may be required to execute the training.

.6 The controls contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.

.7 The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.

.8 Training shall include:

a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.

b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.

c. Discussion of relevant health and safety issues and concerns.

d. Discussion of warranties and guarantees.

e. Common troubleshooting problems and solutions.

f. Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.

g. Discussion of any peculiarities of equipment installation or operation.

h. Coordinate the format and training agenda with Mechanical (Division 25)

i. Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.

.9 Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.

.10 Training shall occur after functional testing is complete, unless approved otherwise by the Departmental Representative.

.11 Duration of Training. The contractor shall provide training on each piece of equipment and system according to the following training hour.

SYSTEM	**HOURS**	
Power Systems • Primary Power • Secondary Power • Grounding and Bonding • Control systems	22	
Equipment vibration and seismic installation	2	

3.8 GENERAL

.1 Test all wiring devices for correct operation.

.2 Check if all equipment is CSA approved before hook up.

.3 Test all receptacles and outlets for proper polarity and circuitry.

.4 Check all equipment.

.5 Check for circuit labelling.

.6 Examine fire stopping assembly is installed as per it ULC listing. Allow for 1% destructive testing (or a minimum of one, whichever greater) of installed fire stopping. All assemblies tested shall be repaired.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 14 – Power Cable and Terminations (1001V and Over)

1.2 REFERENCES

.1 CSA Group

- .1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.
- .2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).
- .3 CSA C22.2 No.65-13, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 01 50 – General Instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

- .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect connectors and terminations.
- .3 Replace defective or damaged materials with new.

1.4 WATE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

Part 2 Products

2.1 CONNECTORS AND TERMINATIONS

.1 Copper long barrel compression connectors to CSA C22.2 No.65 as required sized for conductors.

Part 3 Execution

3.1 INSTALLATION

.1 Install stress cones, terminations, and splices in accordance with manufacturer's instructions.

.2 Bond and ground as required to CSA C22.2No.41.

.3 Connectors for feeders and terminations over 1000V per section 26 05 14.

END OF SECTION

Approved: 2008-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 - Common Work Results for Electrical

.2 Section 26 05 22 - Connectors and Terminations

.3 Section 26 05 28 - Grounding – Secondary

1.2 REFERENCES

.1 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE 837-02, Qualifying Permanent Connections Used in Substation Grounding.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 01 50 – General Instructions.

Part 2 Products

2.1 MATERIALS

.1 Rod electrodes: stainless steel, 19 mm diameter by 3m long.

.2 Conductors: bare, stranded, tinned soft annealed copper wire, size No. 4/0 AWG and 2/0 AWG for ground bus, electrode interconnections, metal structures, gradient control mats, transformers, switchgear, motors, ground connections.

.3 Conductors: bare, stranded, tinned soft annealed copper wire, size No. 4 AWG unless otherwise indicated on drawings for grounding cable sheaths, raceways, pipe work, screen guards, switchboards, potential transformers.

.4 Conductors: pvc insulated coloured green, stranded tinned soft annealed copper wire No. 10 AWG for grounding meter and relay cases.

.5 Conductors: No. 3/0 AWG extra flexible (425 strands) copper conductor for connection of switch mechanism operating rod to gradient control mat, fence gates, vault doors.

.6 Bolted removable test links.

.7 Gradient control mat as indicated on drawings.

.8 Accessories: non-corroding, necessary for complete grounding system, type, size material as indicated, including:

.1 Grounding and bonding bushings.
.2 Protective type clamps.
.3 Bolted type conductor connectors.
.4 Thermit welded type conductor connectors.
.5 Bonding jumpers, straps.
.6 Pressure wire connectors.
.7 Permanent compression connectors.

.9 Wire connectors and terminations: to Section 26 05 22 - Connectors and Terminations.

Part 3 Execution

3.1 INSTALLATION

.1 Install continuous grounding system including, electrodes, conductors, connectors and accessories as indicated and to requirements of local authority having jurisdiction.

.2 Ground fences to grounding system independent of station ground.

.3 Install connectors and cadweld in accordance with manufacturer's instructions.

.4 Protect exposed grounding conductors during and after construction.

.5 Make buried connections, and connections to electrodes, structural steel work, using copper welding by thermit process.

.6 Use mechanical connectors for grounding connections to equipment provided with lugs.

.7 Use No. 4/0 AWG bare copper cable for main ground bus of substation and No. 2/0 AWG bare copper cable for taps on risers from main ground bus to equipment.

.8 Use tinned copper conductors for aluminum structures.

.9 Do not use bare copper conductors near un-jacketed lead sheath cables.

3.2 ELECTRODE INSTALLATION

.1 Install ground rod electrodes. Make grounding connections to station equipment.

.2 Install ground rod electrodes at transformer and switchgear locations.

.3 Install gradient control mats. Connect mats to station ground electrode and switch mechanism operating rods.

.4 Make special provision for installing electrodes that will give acceptable resistance to ground value, where rock or sand terrain prevails.

3.3 EQUIPMENT GROUNDING

.1 Install grounding connections as indicated to typical station equipment including: metallic water main, line sky wire, neutral, gradient control mats. Non current carrying parts of: transformers, generators, motors, circuit breakers, reclosers, current transformers, frames of gang-operated switches and fuse cutout bases. Cable sheaths, raceways, pipe work, screen guards, switchboards, potential transformers. Meter and

relay cases. Any exposed building metal, within or forming part of station enclosure. Sub-station fences, pothead bodies. Outdoor lighting.

.2 Ground hinged doors to main frame of electrical equipment enclosure with flexible jumper.

.3 Connect metallic piping (water, oil, air, etc.) inside station to main ground bus at several locations, including each service location within station.[Make connections to metallic water pipes outside station to assist in reduction of station ground resistance value].

3.4 NEUTRAL GROUNDING

.1 Connect transformer neutral and distribution neutral together using 1000 V insulated conductor to one side of ground test link, the other side of the test link being connected directly to main station ground. Ensure distribution neutral and neutrals of potential transformers and service banks are bonded directly to transformer neutral and not to main station ground.

.2 Interconnect electrodes and neutrals at each grounding installation.

.3 Connect neutral of station service transformer to main neutral bus with tap of same size as secondary neutral.

.4 Ground transformer tank with continuous conductor from tank ground lug through connector on ground bus to primary neutral. Connect neutral bushing at transformer to primary neutral in same manner.

3.5 CABLE SHEATH GROUNDING

.1 Bond single conductor, metallic sheathed cables together at one end only. Break sheath continuity by inserting insulating sleeves in cables.

.2 Use No. 6 AWG flexible copper wire soldered, not clamped, to cable sheath.

.3 Connect bonded cables to ground with No. 2/0 AWG copper conductor.

3.6 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform earth loop test and resistance tests using method appropriate to site conditions and to approval of the Consultant and local authority having jurisdiction.

.3 Perform test before energizing electrical system.

.4 Provide step-and-touch potential calculations using measured station ground resistance measurements. Submit test result and inspection certificate before energizing electrical system.

END OF SECTION

Approved: 2008-06-30

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 - Common Work Results for Electrical

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-12, Canadian Electrical Code, Part 1, 22nd Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management plan.

Part 2 Products

2.1 JUNCTION AND PULL BOXES

.1 Construction: welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on flat covers.

Part 3 Execution

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

.3 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 IDENTIFICATION

.1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating system name, voltage and phase, and function or as indicated.

END OF SECTION

Approved: 2006-12-31

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results for Electrical

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CAN/CSA C22.2 No. 18-98(R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
- .2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.
- .3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83-M1985(R2003), Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.2-M1984(R2003), Rigid PVC (Unplasticized) Conduit.
- .6 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 01 50 General Instructions.

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

- .1 Submit cable manufacturing data.

.3 Quality assurance submittals:

- .1 Test reports: submit certified test reports.
- .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .3 Instructions: submit manufacturer's installation instructions.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse recycling in accordance with Section 01 01 50 General Instructions.

.2 Place materials defined as hazardous or toxic waste in designated containers.

Part 2 Products

2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel, threaded.

.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings with expanded ends.

.3 Rigid pvc conduit: to CSA C22.2 No. 211.2.

.4 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

2.2 CONDUIT FASTENINGS

.1 One-hole malleable iron straps to secure surface conduits 50 mm and smaller.

.1 Two-hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 1.5m on centre.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 27 mm and larger conduits.

.3 Connectors and coupling: Steel set screw connectors and couplings for all EMT.

2.4 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

.3 Use rigid galvanized steel threaded conduit except where specified otherwise.

.4 Use electrical metallic tubing (EMT), in the electrical room where not subject to mechanical injury.

.5 Use rigid schedule 40 pvc conduit, concrete encased, for underground exterior installations.

.6 Minimum conduit size for lighting and power circuits: 21 mm.

.7 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.8 Mechanically bend steel conduit over 21 mm diameter.

.9 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.10 Install fish cord in empty conduits.

.11 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.12 Dry conduits out before installing wire.

.13 All rigid steel threaded conduit connected to boxes, panelboard and cabinet shall be terminated with a threaded hub type connector.

.14 Color code all concealed and exposed conduit as per section 26 05 00 requirements.

.15 Ground Wires:

.1 Provide ground wire for each branch circuit wiring sized to CSA-C22.1 Table 16.

.2 Provide ground wire for service feeder sized to CSA-C22.1 Table 17.

.3 Minimum ground wire size shall be #12 AWG for power wiring, #14 AWG for class 2 wiring.

.16 Fittings for threaded rigid steel and aluminum conduit: Threaded hub type connectors to be installed on conduit on conduits at all connections to junction or pull boxes and at panelboards. Acceptable products precision cast, machined surface equal to T&B Bullet, HZ.HTZ Hubs or Myers Hub ST4.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended or surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONDUITS UNDERGROUND

.1 Slope conduits to provide drainage.

.2 Waterproof joints (PVC excepted) with heavy coat of bituminous paint.

.3 Conduit to be rigid schedule 40 PVC.

.4 Provide warning tape to meet Canadian Electrical Code requirements.

.5 For areas outside of building foot prints, conduits to be encased in minimum 100mm concrete.

3.5 CLEANING

.1 Proceed in accordance with Section 01 01 50 – General Instructions.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials, components, cabinets, instruments and installation for metering and switchboard Instruments.

1.2 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results – Electrical

1.3 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI C39.1-1981, Requirements, Electrical Analog Indicating Instruments.

.2 Canadian Standards Association, (CSA International)

.1 CAN3-C17-M84(R2004), Alternating-Current Electricity Metering.

.2 CAN3-C13-M83(R2003), Instrument Transformers.

1.4 PRODUCT DATA

.1 Indicate meter, instrument, outline dimensions, panel drilling dimensions and include cutout template.

1.5 QUALITY CONTROL

.1 General:

.1 Contractor to be responsible for quality control of the products and installation in this section.

.2 Submit all information and material required for the Quality Management System, in accordance with Section 26 05 00 – Work Results for Electrical.

.3 Quality Control Program Submittals:

.1 Quality Control Check Sheet

.4 Quality Control Check Sheet:

.1 Prepare and maintain Quality Control Check Sheets.

.2 Check sheet to be kept on site and be made available for review by the Engineer at any time.

.3 Check sheets to be filled in and submitted for review, prior to substantial completion.

.4 Check sheets for each metering and switchboard instruments to include the following information:

.1 Metering and switchboard instruments specifications and installation details

.2 Itemize a check list for the following:

.1 Type of meter and instruments
.2 Proper connections
.3 Characteristics of each meter and instrument
.4 Check for correct and proper calibration

.3 For each tabulated item, state the following:
.1 Does the item comply with the specification? Yes/No/Not Applicable.

.5 Identify any areas of non compliance and the proposed action to make it complaint.

Part 2 Products

2.1 METER

.1 Secondary 208V digital power meter with display for kW demand, kWhr energy, and percent power factor provides power consumption data for information. Digital power meter shall be IP based and have communication port supporting the RS-232C and RS485 standard. 10 Base T Ethernet port is also required.

.2 The contractor shall supply and install an appropriate converter to interface new digital meter with the existing Institution DDC system to make a complete and fully operation monitoring system.

2.2 SHOP INSTALLATION

.1 All wiring and inter-wiring shall be factory installed. Provide slip on plaster label for wiring identification to match schematic wiring diagram supplied.

.2 Install meters and instrument transformers in separate compartment of switchboard.

.3 Install instruments on switchboard.

.4 Ensure adequate spacing between current transformers installed on each phase.

.5 Verify correctness of connections, polarities of meters, instruments, potential and current transformers, transducers, signal sources, electrical supplies.

Part 3 Execution

3.1 METERING INSTALLATION

.1 Install meters and instruments in location free from vibration and shock.

.2 Make connections in accordance with diagrams.

.3 If applicable, ensure power factor corrective equipment connected on load side of meter.

.4 Connect meter and instrument transformer cabinets to ground.

.5 Installation of communication cable from communication port for interfacing the power meter with Institution DDC system and the Institution system is by others.

.6 Locate meter integrated within the front panel of the switchboard enclosure.

3.2 FIELD QUALITY CONTROL

.1 Conduct tests in accordance with Section 26 05 00 - Common Work Results – Electrical, and in accordance with manufacturer's recommendations.

.2 Perform simulated operation tests with metering, instruments disconnected from permanent signal and other electrical sources.

.3 Verify correctness of connections, polarities of meters, instruments, potential and current transformers, transducers, signal sources and electrical supplies.

.4 Perform tests to obtain correct calibration.

.5 Do not dismantle meters and instruments.

.6 Provide a written report for commissioning of the metering operation.

.7 Provide onsite training for owner's maintenance staff.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical

.2 Section 26 40 00.01 - Primary Lightning Arrestors

1.2 REFERENCES

.1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers, Inc. (IEEE)

.1 ANSI/IEEE 386-95(R2001), Separable Insulated Connector Systems for Power Distribution Systems Above 600 V.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-C227.4-06, Three-Phase Pad-Mounted Distribution Transformers with Separable Insulated High-Voltage Connectors.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 01 50 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, and limitations.

.3 Submit shop drawings and indicate:

.1 Anchoring method and dimensioned foundation template.

.2 Dimensioned cable entry locations.

.4 Identified internal and external component layout on assembly drawing.

.5 Insulating liquid capacity.

.6 Submit primary fuse and secondary breaker time-current characteristics.

.7 Quality Assurance Submittals: submit following in accordance with Section 01 01 50 – General Instructions.

.1 Certificates: submit production certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

.8 Closeout Submittals:

.1 Provide operation and maintenance data for pad mounted distribution transformers for incorporation into manual specified in Section 01 01 50 – General Instructions.

.2 Include insulating liquid maintenance data.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 MAINTENANCE

.1 Provide maintenance materials in accordance with Section 01 01 50 – General Instructions.

Part 2 Products

2.1 EQUIPMENT

.1 Constructed for outdoor installation CSA 3R, three phase dead front pad mounted distribution transformers: to CSA C227.4. Separable insulated connectors for power distribution systems above 600 V: to ANSI/IEEE 386.

.2 Liquid filled distribution transformer complete with primary and secondary cable compartments and accessories to form complete factory assembled, self contained, steel fabricated unit low profile unit for mounting on concrete pad. The dielectric liquid shall be seed breed environmental friendly type.

.3 High voltage bushing wells for connection to distribution system through separable insulated connectors for dead front operation solderless connectors.

.4 Separable insulated connectors.

.5 Spade type low voltage terminals.

.6 Connectors for primary and secondary cables.

.7 Designed and constructed for loop feed operation.

.8 Two fuse system as defined in CAN/CSA 227.04-06 to be provided and complete with 3 spare BAYONET fuses.

.9 Mechanical interlock systems to prevent access to primary compartment unless primary supply is isolated at source. Separate padlocking for primary compartment door.

.10 Three 8.4KV MCOV and 10kV duty cycle lightning arrestors to be Elbow style in accordance with Section 26 40 00.01 – Primary Lightning Arrestors The lightning

arresters to be connected to the spare bushings provided with the loop feed type transformer

.11 Load break inserts for elbow connectors.

.12 Stays to hold compartment doors in 110 degrees open position.

.13 Barrier shall be provided between secondary voltage and primary voltage compartment.

.14 Note: Load break elbows are not permitted and not to be used.

2.2 TRANSFORMER CHARACTERISTICS

.1 Primary voltage: 12.5/7.2 kV, 60 Hz, delta connected, three phase, neutral and grounded.

.2 Secondary voltage: voltage as indicated on drawing, wye connected, three phase, four wire, neutral grounded.

.3 Capacity: kVA rating as indicated on drawing.

.4 Copper winding.

.5 Type: ONAN.

.6 Temperature Rise: 65 degree C.

.7 Basic impulse level: 95 kV.

.8 Impedance: 4%.

.9 No load losses: standard.

.10 Full load losses: standard.

.11 Average sound level: 55dB.

2.3 VOLTAGE TAPS

.1 Four-2.5% taps, 2-FCAN, 2-FCBN.

2.4 TAP CHANGER

.1 Externally operated off-load tap changer, with provision for padlocking on 3 phase units.

2.5 ACCESSORIES

.1 Liquid temperature thermometer with two sets of contacts.

.2 Liquid level gauge with two sets of contacts.

.3 Pressure relief device.

.4 25 mm drain valve.

.5 25 mm filler plug.

.6 Voltage selector switch.

2.6 GROUNDING

.1 Copper grounding bus.

.2 Connectors for grounding conductor size 4/0 or as indicated.

2.7 FINISH

.1 Two coats of enamel over one coat of rust resistant primer. Finish exterior of unit in accordance with Section 26 05 00 - Common Work Results for Electrical.

2.8 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Nameplate information label to match existing Institution standard.

2.9 WARNING SIGNS

.1 Provide warning signs in accordance with Section 26 05 00 - Common Work Results for Electrical.

2.10 SOURCE QUALITY CONTROL

.1 Submit to Consultant standard factory test certificates of each transformer and type test of each transformer with high voltage accessories in accordance with CSA-C227.4.

2.11 ACCEPTABLE MANUFACTURERS

.1 Carte International, Pioneer, Cam Tran, Cooper Power.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

.2 Transformer to be filled with insulating oil by manufacturer prior to shipment.

3.2 INSPECTION

.1 Check factory made connections of transformer unit for mechanical security and electrical continuity.

.2 Check transformer insulating liquid for correct quantity and specification according to manufacturer's instructions.

.3 Check for leakage of insulating liquid.

3.3 INSTALLATION

.1 Install transformer on pre-cast rc concrete pad or cast-in-place rc concrete pad, size concrete pad to suit transformer shop drawings for physical footprint and cable entries. Submit detailed shop drawings for review.

.2 Set and secure transformer unit in place, rigid, plumb and square. Bolt down transformer in accordance with manufacturer's shop drawings.

.3 Make connections.

.4 Connect transformer unit ground bus to system ground.

.5 When field filling of transformer is necessary, the filling shall be done by transformer manufacturer's representative.

.6 Set taps to produce the rated secondary voltage at no load.

.7 Wire one set of contacts on liquid temperature thermometer, liquid level gauge, to sound alarm when unsafe condition reached, wire second set of contacts to trip transformer circuit interrupter.

.8 Ensure care is taken to prevent contamination of liquid and components when field filling transformer.

.9 Use only metal hose when field-filling transformer with oil: do not use rubber hose.

.10 Set taps to produce rated secondary voltage at no-load.

3.4 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Contractor to include and allow for equipment manufacturer or separate independent testing company to perform on site testing of units and equipments.

.3 Carry out following insulation tests using megger with 20,000 megohm scale and resulting insulation resistance corrected to base of 20 degrees C.

.1 High voltage to ground with secondary grounded for duration of test.

.2 Low voltage to ground with primary grounded for duration of test.

.3 High to low voltage.

.4 Inspect primary and secondary connections for tightness and for signs of overheating.

.5 Inspect and clean bushings and insulators.

.6 Check oil level and temperature indicators.

.7 Set transformer taps to rated voltage as specified.

.8 Inspect for oil leaks and excessive rusting.

.9 Inspect oil level.

.10 Check fuses for correctness of type and size.

.11 Check for grounding and neutral continuity between primary and secondary circuits of transformer.

.12 Record phase and neutral voltages and currents under normal load.

.13 Record tap setting and adjust as directed. Record phase voltage and current with new tap setting.

.14 Failed transformer is to be replaced at no cost and shall be expedite for delivery as soon as possible. Implement temporary solution at no cost.

.15 Obtain inspection certificate of compliance covering field quality control mentioned above from inspection authority and include it with as-built drawings and maintenance manuals.

3.5 CLEANING

.1 Proceed in accordance with Section 01 01 50 – General Instructions.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for outdoor pad mounted dead front primary switchgear assembly for switching and sectionalizing.

.2 The switchgear and switching configuration shall be in accordance with the single-line diagram.

1.2 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical

1.3 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI C57.12-99, Distribution and Power Transformers, Guide for Loading Dry-Type, appendix to ANSI C57.12 standards.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-C22.2No.31-M89(R2000), Switchgear Assemblies.

.2 CSA C22.2 No.58-M1989(R2000), High Voltage Isolating Switches.

.3 CSA G40.20/G40.21-98(June 2000), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.3 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC G1-1-1958, Indoor and Outdoor Switch and Bus Insulators.

.2 EEMAC G8-3.3, Metal Enclosed Interrupter Switchgear Assemblies.

.4 National Electrical Manufacturers Association (NEMA)

.5 The applicable portions of ANSI C57.12.28, covering enclosure integrity for pad mounted equipment.

.6 The applicable portions of ANSI C37.71, ANSI C37.72, ANSI C37.73, IEC 56, and IEC265-1 (Class A), which specify test procedures and sequences for the load-interrupter switches, fault interrupters, and the complete switchgear assembly.

1.4 DESCRIPTION OF SYSTEM

.1 Primary switchgear assembly to include:

.1 Primary VT to provide 120V power for motor operator

.2 Pad mounted enclosure, dead front construction.

.3 Load interrupter switches

.4 Resettable fault interrupters

.5 Busbar.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 26 05 00 Clause 1.5.1 - Submittal Procedures.

.2 Indicate:

- .1 Floor anchoring method and dimensioned foundation template.
- .2 Dimensioned cable entry and exit locations.
- .3 Dimensioned cable termination height.
- .4 Dimensioned position and size of busbars and details of provision for extension.
- .5 Dimensioned positions of main connections, including air clearances and support insulators.
- .6 Layout of internal and front panel components suitably identified.
- .7 Time current characteristics curves of protection devices.
- .8 Cable termination details.
- .9 Grounding and details.
- .10 120V power source for motor operator for the interrupter.

1.6 QUALITY ASSURANCE

.1 Submit quality assurance as follows:

- .1 Provide manufacturer's type test certificates indicating switchgear cubicles and components tested as integrated assembly.
- .2 Submit to Engineer test procedures, at least 10 days prior to testing.
- .3 Submit 6 copies of production test results to Engineer before equipment is shipped from factory.

1.7 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for primary switchgear assembly for incorporation into manual specified in Section 26 05 00 Clause 1.1.0 Maintenance Manual.

.2 Include 6 copies of maintenance data for complete switchgear assembly including components.

1.8 DELIVERY AND STORAGE

.1 Ship and store switchgear assembly in upright position, provide weather proof cover.

.2 Store in weather protected, warm, dry enclosure.

.3 Keep doors locked and protect instruments from damage and dust.

.4 Ship channel base sills, anchoring devices in advance of switchgear.

1.9 SCHEDULING

.1 Co-ordinate time current characteristics of protective devices and relay.

Part 2 Products

2.1 MATERIALS

.1 Switchgear assembly: to CAN/CSA-C22.2 No.31, EEMAC G8-3.3.

.2 Steel for cubicles: to CSA G40.21.

.3 Insulators: to EEMAC G1-1, CSA C22.2 No.58.

.4 Enclosure finishes to ANSI C57.12.

2.2 PRIMARY SWITCHGEAR

.1 The switchgear shall vacuum type load-interrupter switches with 3 position visible switch (open/close/ground), motor operators and controls, low-voltage compartment/enclosure, microprocessor-based overcurrent control for the fault interrupters. The switch shall be mechanically interlocked such that the vacuum switch or VFI first interrupts the current and then the visible break switch may be operated. The ground position allows the cables to be grounded without disconnecting or moving the terminal. The load-interrupter switch terminals shall be equipped with bushings rated 600 amperes continuous, and fault-interrupter terminals shall be equipped with bushing wells rated 600 amperes continuous or bushings rated 600 amperes continuous to provide for dead break connection. Manual operating mechanisms and viewing windows shall be located on the opposite side of the tank from the bushings and bushing wells, so that operating personnel shall not be required to perform any routine operations in close proximity to high-voltage dead break connector and cables

.2 Outdoor, pad mounted, low profile, dead front construction. All terminations are covered with insulating rubber that is grounded. All internal parts are completely sealed in a steel tank to reduce maintenance and eliminate the problem of moisture, dirt, and wildlife.

.3 Switching configuration: multiple way units as indicated on drawing.

.4 12.5kV-120V VT to provide 120V power for the motor operator for the interrupter.

.5 Rating shall be: 12.5kV nominal voltage, 600A, 3 phase, 3 wire, short circuit capacity 25,000 kA, BIL 125 kV, 12.5kA 3 second symmetrical.

.6 Duty cycle to IEEE Std C37.60-2003 TM Standard.

.7 Sealed insulation system, insulation options shall be environmentally friendly high fire point E200 fluid and bio degradable seeded oil Envirotemp FR3 fluid.

2.3 CONSTRUCTION

.1 Viewing Windows:

.1 Each load-interrupter switch shall be provided with a viewing window to allow visual verification of the switch-blade position (closed, open, and grounded) while shining a flashlight on the blades.

.2 Each fault interrupter shall be provided with a large viewing window to allow visual verification of the disconnect-blade position (closed, open, and grounded) while shining a flashlight on the blades.

.3 Viewing windows shall be located on the opposite side of the gear from the bushings and bushing wells so that operating personnel shall not be required to perform any routine operations in close proximity to high-voltage elbows and cables.

.4 A cover shall be provided for each viewing window to prevent operating personnel from viewing the flash which may occur during switching operations.

.5 High-Voltage Bus:

.1 Bus and interconnections shall withstand the stresses associated with short-circuit cur-rents up through the maximum rating of the switchgear.

.2 Tinned copper conductor.

.2 Grounding:

.1 One ground-connection pad shall be provided on the vacuum-tight tank of the switchgear.

.2 One ground-connection pad per way shall be provided.

.3 Connections:

.1 Load-interrupter switches shall be equipped with 600-ampere bushings, and fault interrupters shall be equipped with 200-ampere bushing wells.

.2 Bushings and bushing wells shall be located on one side of the gear to reduce the required operating clearance.

.3 Bushings and Bushing Wells:

.1 Bushings and bushing wells shall conform to ANSI/IEEE Standard 386.

.2 Bushings and bushing wells shall include a semi conductive coating.

.3 Bushings and bushing wells shall be mounted in such a way that the semi conductive coating is solidly grounded to the vacuum-tight tank.

2.4 LOAD INTERRUPTER SWITCHES

.1 The three-phase, group-operated load-interrupter switches shall have a three-time and ten-time duty-cycle fault-closing rating as specified under "Ratings."

.2 The switch shall be provided with an integral ground position that is readily visible through the viewing window to eliminate the need for cable handling and exposure to high voltage to ground the equipment.

.3 The ground position shall have a three-time and ten-time duty-cycle fault-closing rating.

.4 The switch shall be provided with an open position that is readily visible through the viewing window to eliminate the need for cable handling and exposure to high voltage to establish a visible gap.

.5 The switch will be complete with Live Line indicators (LLI) for each phase, and Capacitive Voltage Transformers (CVT's), for monitoring the incoming voltage of the non load break 600 amp bushings. This feature will enable the operator to take the switch to ground only on de-energized and locked out cables.

2.5 OPERATING MECHANISMS

.1 Load-interrupter switches and fault interrupters shall be operated by means of a quick-make, quick-break mechanism.

.2 The manual handle shall charge the operating mechanism for closing, opening, and grounding of the switches and fault interrupters.

.3 A single, integrated operating mechanism shall fully operate each fault interrupter or load interrupter switch in a continuous movement, so that additional operations are not required to establish open or grounded positions.

.4 Operating mechanisms shall be equipped with an operation selector to prevent inadvertent operation from the closed position directly to the grounded position, or from the grounded position directly to the closed position. The operation selector shall require physical movement to the proper position to permit the next operation.

.5 Operating shafts shall be pad lockable in any position to prevent operation.

.6 The operation selector shall be pad lockable to prevent operation to the grounded position.

.7 The operating mechanism shall indicate switch position which shall be clearly visible from the normal operating position.

2.6 PAD MOUNTED TYPE

.1 The vacuum-tight tank shall be made of Type 304L stainless-steel.

.2 The following optional feature should be provided:

.1 The switchgear shall be provided with a pad-mounted enclosure suitable for installation of the gear on a concrete pad.

.2 The pad-mounted enclosure shall be separable from the switchgear to allow clear access to the bushings and bushing wells for cable termination.

.3 The basic material shall be 11 gauge hot-rolled, pickled and oiled steel sheets.

.4 The enclosure shall be provided with removable front and back panels, and hinged lift-up roof sections for access to the operating and termination compartments. Each roof section shall have a retainer to hold it in the open position.

.5 Lift-up roof sections shall overlap the panels and shall have provisions for pad-locking that incorporate a means to protect the padlock shackle from tampering.

.6 The base shall consist of continuous 90-degree flanges, turned inward and welded at the corners, for bolting to the concrete pad.

.7 Panel openings shall have 90-degree flanges, facing outward, that shall provide strength and rigidity as well as deep overlapping between panels and panel openings to guard against water entry.

.8 For bushings rated 600 amperes continuous, the termination compartment shall be of an adequate depth to accommodate encapsulated surge arresters mounted on 600-ampere elbows having 200-ampere interfaces.

.9 For bushing wells rated 200 amperes continuous, the termination compartment shall be of an adequate depth to accommodate 200-ampere elbows mounted on feed thru inserts.

.10 An instruction manual holder shall be provided.

.11 Non-removable lifting tabs shall be provided.

2.7 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Nameplates:

.1 Switchgear designation: label - white plate, black letters, size7, engraved.

.2 Individual cubicle designations: labels - white plate, black letters, size 7, engraved.

2.8 WARNING SIGNS

.1 Provide warning signs in accordance with Section 26 05 00 - Common Work Results for Electrical.

2.9 ACCEPTABLE MANFACTURER

.1 Cooper, Elastimold, Hubbell

Part 3 Execution

3.1 INSTALLATION

.1 Set and secure switchgear assembly in place on channel base, rigid, plumb and square.

.2 Provide concrete pad and bolt down equipment for seismic restraint.

.3 Provide 120V power for motor operated gear and anti-condensation heater.

.4 Ensure fixed housing into which interrupter and circuit breaker moving carriage enters, is plumb.

.5 Check factory made connections for mechanical security and electrical continuity.

.6 Make field connections in accordance with manufacturer's recommendations.

.7 Run grounding conductor 4/0 AWG bare copper in 25 mm conduit from pad mount switchgear ground busbar to ground grid and building system ground busbar as required and as indicated.

.8 Check fuse sizes and/or relay, trip unit settings against co-ordination study to ensure proper working and protection of components and that co-ordinated sequence of action is established.

.9 Render entire assembly rodent and insect proof by means of plates, screens and grouting.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Check insulation of switchgear assembly with 1000V megger. If values not satisfactory, clean, and dry and heat switchgear and repeat tests until readings acceptable to manufacturer's recommended levels. Replace parts that do not meet required performance as required.

.3 Operate load interrupter and circuit breaker closing and tripping mechanisms, to verify correct functioning.

.4 Check phase rotation of each feeder.

.5 Place primary switchgear in service and check ammeter, voltmeter, wattmeter, power factor meter readings to ensure proper functioning of instruments and satisfactory phase balance and power factor of loads.

.6 Check fuses for correct type and rating.

.7 Check for grounding and neutral continuity between station ground and system neutral.

.8 Have factory representative commission final installation and certify proper operation and installation in accordance with Section 26 05 15 - Commissioning of Electrical Systems.

.9 Coordinate with manufacturer for start up and commissioning of pad mounted switchgear.

.10 Calibrate equipment prior to commissioning in accordance with NETA standards, latest edition.

.11 Commission final installation and certify proper operation and installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 09 02 – Metering and Switchboard Instruments

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-C22.2 No.31-04, Switchgear Assemblies

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC G8-3.3, Metal-Enclosed Interrupter Switchgear Assemblies

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 01 50 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for switchboards and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit maintenance materials in accordance with Section 01 01 50 – General Instructions.

.2 Provide spare parts as recommended by manufacturer for maintenance period of 2 years minimum.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 01 50 – General Instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect switchboards from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Rating: 120/208V, 3 phase, 4 wire, amperage as indicated, 65kA short circuit current (rms symmetrical) or as indicated.

.2 Cubicles: free-standing, dead front, size as indicated.

.3 Distribution section.

.4 Hinged access panels with captive knurled thumb screws.

.5 Bus bars and main connections: 99.3% tinned copper.

.6 Identify phases with colour coding.

.7 Complete with drip shields.

2.2 ENCLOSURE

.1 Main incoming section to contain:

.1 Side entry pull box, sized as shown, to permit feeder drip loop

.2 Distribution sections to contain:

.1 Molded case circuit breakers sized as indicated

.2 Tinned copper bus, from main section to distribution sections including vertical bussing.

.3 Blanked off spaces for future units.

.4 Metal enclosed, free standing, floor mounted, dead front, indoor, CSA enclosure 1 cubicle unit with sprinkler shield.

.5 Ventilating louvres: vermin, inspect proof with easily replaceable fibreglass filters.

.6 Access from front.

.7 Steel channel sills for base mounting in single length common to multi-cubicle switchboard.

.8 Provision for future extension as indicated on drawing.

2.3 BUS BARS

.1 Three phase and full capacity neutral, bare busbars, continuous current rating as indicated on drawing. A self-cooled, extending full width of multi-cubicle switchboard, suitably supported on insulators.

.2 Main connections between bus and major switching components to have continuous current rating to match major switching components.

.3 Busbars and main connections: 99.30% conductivity.

.4 Provision for extension of bus without need for further drilling or preparation in field.

.5 Tin plated joints, secured with non-corrosive bolts and Belleville washers.

.6 Identify phases of busbars by suitable marking.

.7 Busbar connectors, when switchboard shipped in more than one Section.

2.4 GROUNDING

.1 Copper ground bus not smaller than 50 x 6 mm extending full width of multi-cubicle switchboard and situated at bottom.

.2 Lugs at each end for size 4/0 AWG grounding cable.

2.5 MOLDED CASE & DRAW-OUT CIRCUIT BREAKERS

.1 Refer to Section 26 28 21 – Molded Case & Draw-out circuit breakers

2.6 INSTRUMENTS

.1 Instruments and digital information meter in accordance with Section 26 09 02 – Metering and Switchboard Instruments

2.7 FINISHES

.1 Apply finishes in accordance with Section 26 05 00 – Common Work Results for Electrical

.1 Cubicle exteriors: grey

2.8 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 – Common Work Results for Electrical.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Locate switchgear assembly as indicated and bolt to floor.

.2 Connect main secondary power supply to main breaker, or as indicated on drawing.

.3 Connect load side of breakers in distribution cubicles to distribution feeders.

.4 Check factory made connections for mechanical security and electrical continuity.

.5 Run one grounding conductor 4/0 AWG bare copper in 25 mm conduit from ground bus to ground.

.6 Check trip unit settings against co-ordination study to ensure proper working and protection of components.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 – Common Work Results for Electrical.

.2 Include all associated costs to have manufacturer's representative visit the site for 8 hours to aid in commissioning equipment. Forward all commissioning documentation to the Consultant for review.

.3 Coordinate field control performance and testing with designated commission agent.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials and installation for primary lighting arresters.

1.2 RELATED SECTIONS

.1 Section 26 12 19 – Pad Mounted, Liquid Filled, Medium Voltage Transformers

1.3 REFERENCES

.1 American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

.1 ANSI/IEEE C62.36-2000, Standard Test Methods for Surge Protectors Used in Low Voltage Data Communications and Signaling Circuits, Standard Test Methods.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-C233.1-87(R1999), Gapless Metal Oxide Surge Arresters for Alternating Current Systems.

1.4 PRODUCT DATA

.1 Submit product data in accordance with Section 01 01 50 – General Instructions.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material, in appropriate on-site bins, for recycling.

Part 2 Products

2.1 MATERIALS

.1 Arrester component parts: to CAN/CSA-C233.1 and ANSI/IEEE-C62.36.

.2 Three 10.2kV MCOV lightning arrestors to be Elbow style: for installation at Transformer to Section 26 12 19 – Pad Mounted, Liquid Filled, Medium Voltage Transformer. The lightning arresters to be connected to the spare bushings provided with the loop feed type transformer

.3 Arrester characteristics:

.1 Distribution class arrester.

.2 System highest voltage line to line: 12.47 kV, 4 wire grounded neutral.

.3 MCOB (maximum continuous operating voltage): 12.47 kV.

.4 Outdoor type.

.5 Housing: polymer.

Part 3 Execution

3.1 INSTALLATION

.1 Mount arresters as close to transformer as possible.

.2 Connect line terminals to phase conductors.

.3 From arrester ground terminal run No.#4/0 AWG copper ground wire down to ground rod.

.4 From arrester ground terminal run shortest possible #4/0 AWG conductor to secondary neutral of transformer.

.5 Mount arresters adjacent to primary pad mounted transformers and connect line terminals to phase conductors. Connect ground terminals to ground electrode.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 31 23 33.01 – Excavation, Trenching and Backfilling

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittals.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples

.1 Allow continual sampling by Departmental Representative during production.

.2 Provide Departmental Representative with access to source and processed material for sampling.

.3 Supply new or clean sample bags or containers as appropriate for aggregate materials.

.4 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

.5 Submit test results for granular gradation in accordance with Section 01 01 50 – General Instructions.

.6 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative.

.7 Wash aggregates, if required, to meet specifications. Use only equipment approved by Departmental Representative.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 01 50 – General Instructions and with manufacturer's written instructions.

.2 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

.3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

Part 2 Products

2.1 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or of recycled materials which on this project is not permitted.

.2 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances. Recycled materials are not permitted.

.3 Flat and elongated particles of coarse aggregate: to ASTM D4791.

.1 Greatest dimension to exceed 5 times least dimension.

.4 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:

.1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.

.5 Coarse aggregates satisfying requirements of Section 31 23 33.01- Excavating, Trenching and Backfilling to be one of or blend of following:

.1 Crushed rock.

.2 Gravel and crushed gravel composed of naturally formed particles of stone.

2.2 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks minimum before starting production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

.3 Advise Departmental Representative 4 weeks minimum in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for topsoil stripping.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with topsoil stripping only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Topsoil stripping:

- .1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
- .2 Begin topsoil stripping of areas after area has been cleared of brush, weeds, grasses and removed from site.
- .3 Avoid mixing topsoil with subsoil.
- .4 Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2 m.
- .5 Dispose of topsoil off site as directed by Departmental Representative.

.2 Stockpiling:

- .1 Do not stockpile on completed pavement surfaces.
- .2 Stockpile aggregates in sufficient quantities to meet project schedules.
- .3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.
- .4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.
- .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
- .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 hours of rejection.
- .7 Stockpile materials in uniform layers of thickness as follows:
  - .1 Maximum 1.5 m for coarse aggregate and base course materials.
  - .2 Maximum 1.5 m for fine aggregate and sub-base materials.
  - .3 Maximum 1.5 m for other materials.
- .8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
- .9 Do not cone piles or spill material over edges of piles.
- .10 Do not use conveying stackers.
- .11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 01 50 – General Instructions.

- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 01 50 – General Instructions.

.3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.4 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

.5 Waste Management: separate waste materials for recycling in accordance with Section 01 01 50 – General Instructions.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.6 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

.7 Restrict public access to temporary or permanently abandoned stockpiles by means acceptable to Departmental Representative.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 General requirements for excavating and backfilling procedures for installation of underground duct, ductbanks and manholes.

1.2 RELATED SECTIONS

.1 Section 31 05 16 – Aggregate Materials

.2 Section 33 65 73 – Concrete Encased Ductbanks and Manholes

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

- .1 ASTM C117- 04, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136- 06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D422- 63 (2007), Standard Test Method for Particle-Size Analysis of Soils.
- .4 ASTM D698-12, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m ;).
- .5 ASTM D4318-10, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA International)

- .1 CAN/CSA-A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
  - .1 CSA-A3001-08, Cementitious Materials for Use in Concrete.
- .2 CSA-A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.4 U.S. Environmental Protection Agency (EPA)/Office of Water

- .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

.5 Worksafe B.C. Health and Safety Act

.6 Canadian Council of the Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines

.7 BC Ministry of Environment (BC MoE), pursuant to the *Environmental Management Act* (EMA, SBC 2003 Chapter 53, current to June 22, 2011).

.1 The Contaminated Site Regulation (CSR, BC Reg. 375/96, O.C. 1480/96 and M271/2004, including amendments up to BC Reg. 97/2011, May 31, 2011).

.2 Hazardous Waste Regulation (HWR, BC Reg.63/88, O.C. 268/88, including amendments up to BC Reg. 63/2009, April 1, 2009), which includes standards for total concentrations of select substances as well as leachate quality standards.

.3 Standards Triggering Contaminated Soil Relocation Agreements (CSRA, Schedule 7).

.8 Transportation of Dangerous Goods Regulations.

1.4 DEFINITIONS

.1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

.1 Rock: any sound or solid mass material in excess of 0.5 cubic metres, of such hardness and texture that it cannot be effectively loosened or broken down by mechanical ripping equipment with a minimum drawbar pull of 360 kN and/or by means of heavy duty excavation equipment. Frozen material is not classified as rock.

.2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.

.2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.3 Topsoil:

.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

.4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.6 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.7 Unsuitable materials:

.1 Weak, chemically contaminated, and compressible materials.

.2 Frost susceptible materials:

.1 Fine grained soils with plasticity index higher than 10 when tested to ASTM D4318, and classified as CL, CH, CL-ML, ML, and SM with material fine than 0.02 mm exceeding 15%.

.2 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

.8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.

.9 Classification of soils:

.1 Native Soils (Clayey silt and clay) classified as "Not Exceeding CSR Schedule 7, Column 2 Standards": Soil with concentrations of substances less than Contaminated Sites Regulation (CSR) Schedule 7, Column 2 standards or any other standard in the CSR.

.2 Soil classified as "Waste": Soil containing concentrations of substances greater than CSR Schedule 7, Column 2 standards or any other standard in the CSR, but not classified as "Hazardous Waste" under the Hazardous Waste Regulation (HWR). Soil must be disposed of at a permitted waste facility.

.3 Soil classified as "Hazardous Waste": Soil contains substance concentrations that would cause it to be classified as Hazardous Waste under the HWR. Soil must be disposed of at a permitted hazardous waste facility.

1.5 QUALITY ASSURANCE

.1 Qualification Statement: submit proof of insurance coverage for professional liability.

.2 Submit design and supporting data at least 2 weeks prior to beginning Work.

.3 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of British Columbia, Canada.

.4 Keep design and supporting data on site.

.5 Engage services of qualified professional engineer who is registered or licensed in Province of British Columbia, Canada in which Work is to be carried out to design and inspect cofferdams, shoring, bracing and underpinning required for Work.

.6 Health and Safety Requirements:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling and for disposal.

.2 Divert excess aggregate materials from landfill to local quarry, recycling facility for reuse.

1.7 EXISTING CONDITIONS

.1 Examine topographic survey and existing conditions information included with Contract Documents.

.2 Buried services:

.1 Before commencing work verify and establish location of buried services on and adjacent to site.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

.3 Remove obsolete buried services within 2 m of structure: cap cut-offs.

.4 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.

.5 Prior to beginning excavation Work, notify the Engineer and authorities having jurisdiction and establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during Work.

.6 Confirm locations of buried utilities by careful test excavations, soil hydrovac methods or other approved method.

.7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

.8 Where utility lines or structures exist in area of excavation, obtain direction of Engineer before removing and/or re-routing.

.9 Record location of maintained, re-routed and abandoned underground lines.

.3 Existing buildings and surface features:

.1 Conduct, with the Consultant, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, pavement, survey bench marks and monuments which may be affected by Work.

.2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by the Consultant.

.3 Where required for excavation, cut roots or branches as directed by the Consultant.

Part 2 Products

2.1 MATERIALS

.1 Type 1 (bedding and pipe cushion), Type 2 (Granular Sub-base), Type 3 (select subgrade material) and Type 4 (Granular Base) fill: properties to Section 31 05 16 - Aggregate Materials and the following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.2.

.3 Table:

Sieve Designation	% Passing			
	Type 1	Type 2	Type 3	Type 4
75 mm	-	100	100	-
50 mm	-	-	70-100	-
37.5 mm	-	60-100	-	-
25 mm	100	-	50-100	-
19 mm	90-100	35-80	-	100
12.5 mm	65-85	-	-	75-100

Sieve Designation	% Passing			
	Type 1	Type 2	Type 3	Type 4
9.5 mm	50-75	26-60	-	60-90
4.75 mm	25-50	20-40	22-100	40-70
2.36 mm	10-35	15-30	10-85	27-55
1.18 mm	6-26	10-20	-	16-42
0.600 mm	3-17	5-15	-	8-30
0.300 mm	-	-	-	5-20
0.075 mm	0-5	0-5	2-8	2-8

.2 Type 2 Fill (Granular Sub-base): Properties as follows:

.1 Los Angeles degradation: to ASTM C 131. Max % Loss by mass: 40.

.2 Particles smaller than 0.02 mm: to ASTM D 422, Maximum 3%.

.3 Soaked CBR: to ASTM D 1883, Min 40 when compacted to 95% of ASTM D 698.

.3 Type 3 Fill (Select Subgrade Material): well-graded granular material, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials meeting the requirements in the above table.

.1 Recovered rock from the work by blasting, trenching or other approved method may be used if crushed and graded to meet requirements of Type 3.

.4 Type 4 Fill (Granular Base): Properties as follows:

.1 Los Angeles degradation: to ASTM C 131. Max. % loss by weight: 45.

.5 Crushed particles: at least 60% of particles by mass within each of following sieve designation ranges to have at least one freshly fractured face. Material to be divided into ranges using methods of ASTM C 136.

.6 Unshrinkable fill: proportioned and mixed to provide:

.1 Maximum compressive strength of 0.5MPa at 28 days.

.2 Maximum cement content of 25 kg/m; with 40% by volume fly ash replacement

.3 Minimum strength of 0.07 MPa at 24 h.

.4 Concrete aggregates: to CSA A23.1/A23.2.

.5 Cement: Type 10 Portland Cement.

.6 Slump: 160 to 200mm.

Part 3 Execution

3.1 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.2 PREPARATION/PROTECTION

.1 Protect existing features in accordance with the applicable local regulations.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to the Engineer's approval.

.4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.5 Protect buried services that are required to remain undisturbed.

3.3 SOILS CLASSIFIED AS "WASTE"

.1 All Soils at site are classified as "Waste" unless excavation reveals hazardous waste (HW) soils. Obtain directions from Engineer for testing and disposal of hazardous waste (HW) soils.

.2 Include the following in the Environmental Protection Plan:

.1 How excavation, handling, and disposal of the soils will be carried. Include location of disposal facility.

.3 Set up environmental and engineering controls as specified and required as per applicable regulations.

.4 Remove top soil, existing fill material if any and excavate the areas.

.5 Handle, load and transport "waste" soils as per the applicable federal, provincial and municipal regulations.

.6 Dispose as follows.

.1 "Waste": Dispose of at a permitted waste facility.

.7 Backfill excavated areas as specified and indicated.

3.4 STRIPPING OF TOPSOIL

.1 Strip topsoil where required.

.2 Strip topsoil to existing fill materials and native soil.

.1 Do not mix topsoil with existing fill or native soil.

.3 Stockpile on site within the Limit of Construction of each stage of work.

.1 Stockpile height not to exceed 2 m and should be protected from erosion.

.4 Dispose of unused topsoil off site.

3.5 STOCKPILING

.1 Stockpile fill materials on site within the Limit of Construction.

.1 Stockpile granular materials in manner to prevent segregation. Maximum stockpile height is 2.5 metres.

.2 Protect fill materials from contamination.

.3 Protect fill materials from wet weather conditions, precipitation, and excessive moisture.

.4 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Engage services of qualified professional engineer who is registered or licensed in the Province of British Columbia, Canada to design and inspect cofferdams, shoring, bracing and underpinning required for Work.

.2 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance Health and Safety Act for the Province of British Columbia, Canada.

.3 Construct temporary Works to depths, heights and locations as required under the directions of qualified professional engineer responsible for such temporary Works.

.4 During backfill operation:

.1 Unless otherwise indicated or directed by the Engineer, remove sheeting and shoring from excavations.

.2 Do not remove bracing until backfilling has reached respective levels of such bracing.

.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

.5 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.6 Upon completion of substructure construction:

.1 Remove cofferdams, shoring and bracing.

.2 Remove excess materials from site.

3.7 DEWATERING AND HEAVE PREVENTION

.1 Keep excavations free of water while Work is in progress.

.2 Avoid excavation below groundwater table if quick condition or heave is likely to occur.

.3 Protect open excavations against flooding and damage due to surface run-off.

.4 Dispose of water to approved collection areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.

.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

.5 Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

3.8 EXCAVATION

.1 Excavate to lines, grades, elevations and dimensions as indicated.

.2 The existing utilities information (type, location, size, elevations) provided on the existing condition drawings included in the contract documents has not been verified. In order to address this issue the following procedure will be followed:

.1 Excavate and expose all utilities within the excavation limits as indicated. Determine the extent of excavation based on site safety requirements, construction methods and schedule.

.2 Prior to carrying out further work in the excavation, jointly with the Engineer inspect the excavation and identify known and unknown exposed utilities. Based upon the results of the inspection, the Engineer will issue appropriate instructions. Comply with instructions and proceed with the work.

.3 For all connections of new utilities to existing utilities, expose the connection points to existing utilities for verification by the Engineer. Based on the results of the verification, the Engineer will issue appropriate instructions. Comply with the instructions.

.3 Excavation must not cause bearing capacity failure and settlement of adjacent foundations.

.4 For trench excavation, unless otherwise authorized by the Engineer in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.5 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by the Consultant.

.6 Restrict vehicle operations directly adjacent to open excavation and trenches.

.7 Dispose of excavated material off site as per the requirements of applicable regulations as follows:

.1 Soil classified as "Waste": Soil containing concentrations of substances greater than CSR Schedule 7, Column 2 standards or any other standard in the CSR, but not classified as "Hazardous Waste" under the Hazardous Waste Regulation (HWR). Soil must be disposed of at a permitted waste facility.

.8 Do not obstruct flow of surface drainage or natural watercourses.

.9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.10 Notify the Engineer when bottom of excavation is reached.

.11 Obtain the Engineer's approval of completed excavation.

.12 Remove unsuitable material from bottom including those that extend below required elevations to extent and depth as directed by the engineer.

.13 Correct unauthorized over-excavation as follows at no additional cost to the contract:

.1 Fill under bearing surfaces excluding building foundations and footings placed on bedrock with Type 1 fill compacted to not less than 100% Standard Proctor maximum dry density.

.2 Fill under other areas with Type 3 fill compacted to not less than 95% of Standard Proctor maximum dry density.

.14 Hand trim, make firm and remove loose material and debris from excavations.

.1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

.2 Clean out rock seams and fill with concrete mortar or grout to approval of the Consultant.

3.9 FILL TYPES AND COMPACTION

.1 For fill types and compactions for utility trenches, utility structures (manholes/pull boxes) road structures and building and retaining wall foundations, see contract drawings.

3.10 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place and compact granular material for bedding and surround of underground services as indicated.

.2 Place bedding and surround material in unfrozen condition.

3.11 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:

.1 The Consultant has inspected and approved installations.

.2 The Consultant has inspected and approved of construction below finish grade.

.3 Inspection, testing, approval, and recording location of underground utilities.

.4 Removal of concrete formwork.

.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 300 mm loose thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfilling around installations:

.1 Place bedding and surround material as specified elsewhere.

.2 Do not backfill around or over cast-in-place concrete within 48 hours after placing of concrete.

.3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 500 mm.

.4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

.1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from the Engineer.

.6 Place unshrinkable fill in areas as indicated.

.7 Consolidate and level unshrinkable fill with internal vibrators.

.8 Install drainage filter system in backfill as indicated.

3.12 RESTORATION

.1 Upon completion of Work, remove waste materials and debris, trim slopes, and correct defects as directed by the Engineer.

.2 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation as indicated.

.3 Clean and reinstate areas affected by Work as directed by the Engineer.

.4 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

.5 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDE

.1 A complete ductbank and manhole infrastructure for 15kV primary power. Include excavation, trenching and backfilling to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Coordinate the installation of ductbank with all existing civil and electrical site utilities and site works.

1.2 RELATED SECTIONS

.1 Section 31 23 33.01 - Excavating, Trenching and Backfilling

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

- .1 ASTM A82/A82M-05a, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- .2 ASTM A185/A185M-05a, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- .3 ASTM C139-05, Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes.
- .4 ASTM C 478/C478M-06, Standard Specification for Precast Reinforced Concrete Manhole Sections.
- .5 ASTM D1056-00, Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.

.2 Canadian Standards Association (CSA International)

- .1 CAN/CSA-A3000-03(R2005), Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
  - .1 CSA-A3001-03, Cementitious Materials for Use in Concrete.
- .2 CSA A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .3 CAN/CSA-G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement.

1.4 SUBMITTALS

.1 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawings:

- .1 Submit shop drawings for precast manholes or pull boxes.

.3 Quality assurance submittals:

.1 Test reports: submit certified test reports for specified materials from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures, etc.

Part 2 Products

2.1 PVC DUCTS

.1 PVC ducts, type EB1, encased in reinforced concrete.

2.2 PVC DUCT FITTINGS

.1 Rigid PVC opaque solvent welded, translucent pushfit type couplings, bell end fittings, plugs, caps, adaptors as required to complete installation.

.2 Expansion joints.

.3 Rigid PVC 5 degree angle couplings.

2.3 DRAINAGE

.1 Floor drain fittings: consisting of floor drain, back water valve, trap and pipe connection to drainage system.

.2 Storm sewer connection: cast iron service saddle consisting of oil resistant gasket, stainless steel clamp and oil resistant O ring.

.3 Sump pit: 300 x 300 x 125 mm.

2.4 CABLE PULLING EQUIPMENT

.1 Pulling iron: galvanized steel rods, size and shape as indicated.

.2 Pull rope: 6 mm stranded nylon, tensile strength 5 kN, continuous throughout each duct run with 3 m spare rope at each end.

2.5 MARKERS

.1 Concrete type cable markers: 600 x 600 x 100 mm, with words: "Cable", "Joint", "Conduit" impressed in top surface, with arrows to indicate change in direction of duct runs.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION GENERAL

.1 Install underground duct banks including formwork, excavation, trenching and backfilling to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.2 Build duct bank on undisturbed soil or on well compacted granular fill not less than 150 mm thick, compacted to 95% of maximum proctor dry density.

.3 Open trench completely in area of work before ducts are laid and ensure that no obstructions will necessitate change in grade of ducts.

.4 Prior to laying ducts, construct "mud slab" not less than 75 mm thick.

.5 Install ducts at elevations and with slope as indicated and minimum slope of 1 to 400.

.6 Install base spacers at maximum intervals of 1.5 m levelled to grades indicated for bottom layer of ducts.

.7 Lay PVC ducts with configuration and reinforcing as indicated with preformed interlocking, rigid plastic intermediate spacers to maintain spacing between ducts at not less than 75 mm horizontally and vertically.

- .1 Stagger joints in adjacent layers at least 150 mm and make joints watertight.
- .2 Encase duct bank with 75mm thick concrete cover.
- .3 Use galvanized steel conduit for sections extending above finished grade level.

.8 Make transpositions, offsets and changes in direction using 5 degree bend sections, do not exceed a total of 20 degree with duct offset.

.9 Use bell ends at duct terminations in pull boxes, manholes or buildings.

.10 Use conduit to duct adapters when connecting to conduits.

.11 Terminate duct runs with duct coupling set flush with end of concrete envelope when dead ending duct bank for future extension.

.12 Cut, ream and taper end of ducts in field in accordance with manufacturer's recommendations, so that duct ends are fully equal to factory-made ends.

.13 Allow concrete to attain 50% of its specified strength before backfilling.

.14 Use anchors, ties and trench jacks as required to secure ducts and prevent moving during placing of concrete.

- .1 Tie ducts to spacers with twine or other non-metallic material.
- .2 Remove weights or wood braces before concrete has set and fill voids.

.15 Clean ducts before laying:

.1 Cap ends of ducts during construction and after installation to prevent entrance of foreign materials.

.16 Duct cleaning:

.1 Pull 300 mm long x diameter 6 mm less than internal diameter of duct wooden mandrel through each duct, immediately after placing of concrete.

.2 Then pull stiff bristle brush through duct; avoid disturbing or damaging ducts where concrete has not set completely.

.3 Pull stiff bristle brush through each duct immediately before pulling-in cables.

.17 Install four 3 m lengths of 10M reinforcing rods, one in each corner of duct bank when connecting duct to manholes or buildings.

.1 Wire rods to 10M dowels at manhole or building and support from duct spacers.

.2 Protect existing cables and equipment when breaking into existing manholes.

.3 Place concrete down sides of duct bank filling space under and around ducts.

.4 Rod concrete with flat bar between vertical rows filling voids.

.18 Install pull rope continuous throughout each duct run with 3 m spare rope at each end.

3.3 DUCTBANK

.1 Ductbank shall be encased with 30MPa concrete as shown in drawings.

3.4 MARKERS

.1 Mark location of duct runs under hard surfaced areas not terminating in manhole with railway spike driven flush in edge of pavement, directly over run.

.1 Place concrete duct marker at ends of such duct runs.

.2 Construct markers and install flush with grade.

.2 Mark ducts every 30 m along straight runs and changes in direction.

.3 Where markers are removed to permit installation of additional duct, reinstall existing markers.

.4 Lay concrete markers flat and centered over duct with top 25 mm above earth surface.

.5 Provide drawings showing locations of markers.

3.5 FIELD QUALITY CONTROL

.1 Site Tests/Inspections:

.1 Inspection of duct will be carried out by Engineer prior to backfilling.

.2 Placement of concrete and duct cleanout to be done when Engineer present.

3.6 CLEANING

.1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PROJECT NO. R.069376.001
H.V. UPGRADE (PHASE 1 OF 2)
WILLIAM HEAD INSTITUTION – BUILDING 106

APPENDIX A

HAZARDOUS MATERIALS SURVEY
MARCH 2015

PREPARED BY
NORTH WEST ENVIRONMENTAL GROUP LTD.

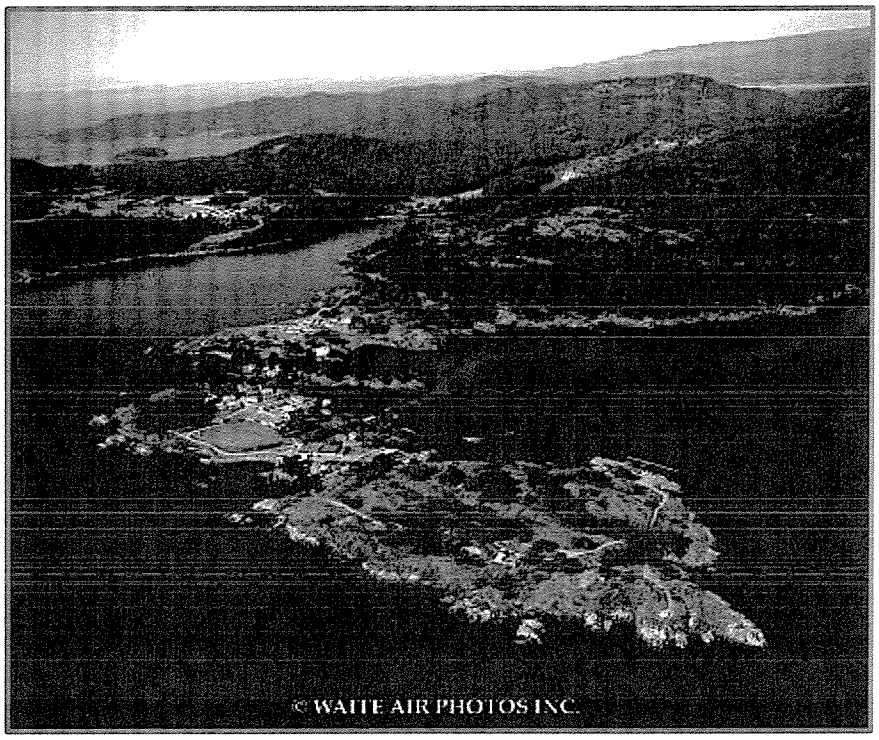
(78 PAGES)

Hazardous Materials Survey

Administration Building

William Head Institution
Correctional Service Canada

Victoria, British Columbia



Prepared for:

Public Works and Government Services Canada
Travaux publics et Services gouvernementaux Canada

Environmental Services
6000 William Head Road
Victoria, British Columbia
V9C 0B5

Prepared by

North West Environmental Group Ltd.

210-2950 Douglas Street
Victoria, British Columbia

NWEG Project: 24717 V.1.0 Rev 1 FINAL

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

North West Environmental Group Ltd. (NWEG) was retained by Public Works and Government Services Canada (PWGSC) Environmental Services on behalf of Correctional Services Canada (CSC) to conduct a destructive Hazardous Materials Risk Assessment Survey in the Administration Building located within William Head Institution, Correctional Service Canada.

North West Environmental Group Ltd. understands that an HVAC upgrade project is proposed for the subject building, the scope of which is still being determined. The purpose of the assessment was to assess for the presence (or absence) and estimated extent of hazardous building materials within the subject building in accordance with the requirements of the Canada Labour Code, Part II (Canada Labour Code) and the current version of British Columbia`s Occupational Health & Safety Regulation (BC Reg. 296/97).

The hazardous building materials considered during this assessment included asbestos containing materials (ACMs), lead, including lead-containing paints (LCPs), polychlorinated biphenyls (PCBs) in equipment, microbiological (mould, moisture or rodent waste) affected building materials, mercury, ozone depleting substances (ODSs) and silica.

Based on North West Environmental Group's visual assessment and on the laboratory analyses on samples collected, hazardous building materials were identified within the subject building.

A summary of our findings and recommendations is presented below. Recommendations pertaining to the handling, removal, transportation and disposal of identified hazardous materials are provided in Section 5 of this report.

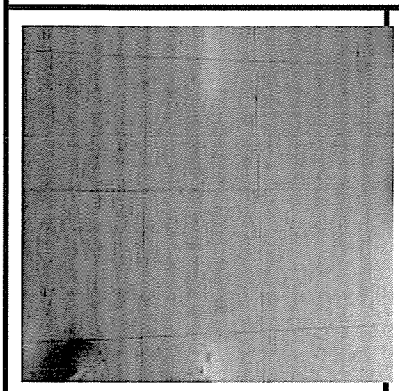
The information provided is to be read in conjunction with the remainder of this report.

Summary of Findings & Recommendations

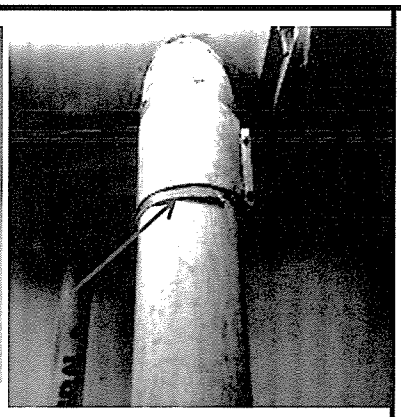
Table 1.1 Hazardous Materials Summary

Hazardous Material	Type and Location	Recommendations
Asbestos	→ Floor Tile (Type 1 – 12 x12 cream streaked) throughout the main floor (approx.. 2000 square feet). **Chrysotile 3%** → Boiler Insulation (Trunk) – fibrous heat pad (1 square foot) **Chrysotile 40%** → Boiler (return Gasket) **Chrysotile 40%** → Electrical Penetrations (Black) **Chrysotile 20%** → Pipe Penetrations (Caulking Dark Red) **Chrysotile 3%** → HVAC Penetration (Grey) **Chrysotile 5%**	→ If in the way of planned work, remove floor tiles following moderate risk work procedures To remove heat pads, gaskets, electrical penetrations, pipe penetrations and HVAC penetrations and caulking's follow moderate risk work procedures. → Consider implementing dust control measures during large scale renovation projects impacting ACMs including dust barriers, negative air units and ante room chambers.

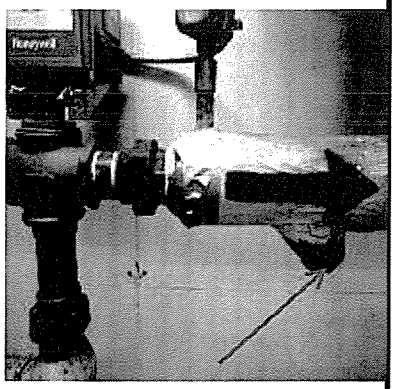
Materials found to contain asbestos in the building:



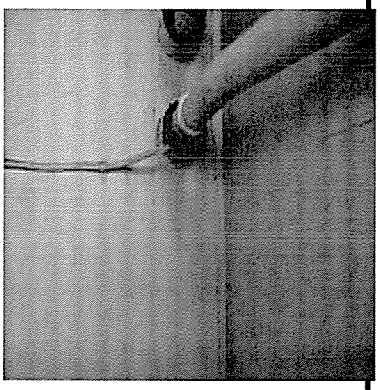
24717-03 – Floor tile Type 1
12"x12" cream streaked
3% Chrysotile



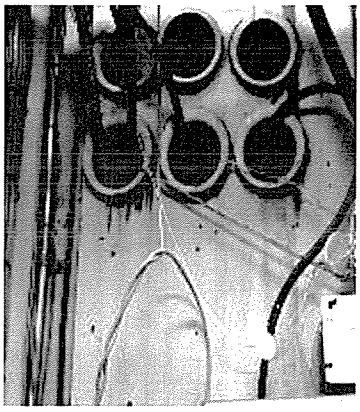
24717-11 – heat shield on
Boiler exhaust
40% Chrysotile



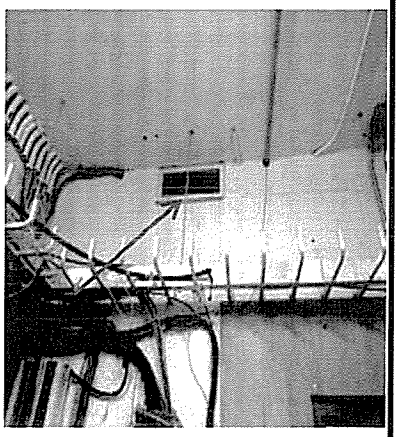
24717-13 – Gasket on boiler
return water line
Contains 40% Chrysotile



24717-15 - black caulking
20% asbestos



24717-16
Caulking Dark Red
3% Chrysotile



24717-17 and 18
HVAC grey caulk
5% Chrysotile

Hazardous Material	Type and Location	Recommendations
PCBs (see room by room survey Appendix 6 for locations of fluorescent light fixtures)	→ Fluorescent Light Ballasts present (potential)	→ Prior to disposal check ballasts for PCBs. Any PCB containing ballasts must be handled as hazardous waste.
Mercury (see room by room survey Appendix 6 for locations of fluorescent light fixtures)	→ Fluorescent Light Tubes	→ Avoid breakage during removal and disposal to licensed site.
Lead	→ 1 of 3 paint samples collected identified LCPs present (on the concrete blocks). The other 2 samples (wall paint and exterior soffit paint) were below the detection limit for the method of 100 mg/kg (or 0.010 % by weight) which means their actual concentration could be above the SCMR limit for lead paint (90-100 mg/kg) or below 100 mg/kg. Lead based or lead containing paint should be assumed to be in all original coatings on and in the building. → Expected to be present in pipe and electrical solder and on bell fittings for cast iron drainage pipes and in electrical equipment (i.e. batteries for emergency lighting & signage. → Lead roof vent caps are present.	→ Maintain paint and solder products in an intact and sealed state. Report damage to Maintenance Supervisor and PWGSC. → Representative TCLP sampling is required before disposal.
Hantavirus – Rodent Droppings	→ Rodent Droppings not observed	→ No action necessary
Radioactive Materials	→ Smoke detectors not observed.	→ No action necessary

Urea Formaldehyde Foam Insulation	→ UFFI not observed	→ No action necessary
Ozone Depleting Substances /Halocarbon Units	→ OD Potential of 0.05 HCFC in Air Conditioner in Lunch Room (R-22), Halocarbon Potential in Fridges in Canteen and Lunch Room (R134a)	→ Prior to disposal of unit, collect, store and recycle or collect and dispose of by a qualified person.
Above Ground Storage Tanks	→ AST not observed	→ No action necessary.
Arsenic	→ Pressure treated wood not observed within the areas investigated	→ No action necessary.
Silica	→ Silica may be present in concrete, cement, mortar, drywall, plaster, ceramic wall and floor tiles, acoustic ceiling tiles, stucco & any other cementitious building materials.	→ During work activities disturbing materials containing silica follow established work procedures that will minimize the release and spread of silica dust.
Mould	→ Suspect visible mould and moisture impacted building materials not observed.	→ No action necessary.
Chemicals	→ Only regular cleaning and process chemicals were observed.	→ Follow recommended manufacturer's directions on MSDS when handling chemicals.

Where hazardous materials were found they can be presumed to be found in similar materials throughout the building.

Warning: in the event any additional suspect materials are encountered during demolition or renovation activities, work on those materials must stop immediately and remain undisturbed until testing confirms the presence or absence of asbestos or other hazardous material. If any materials suspected of containing asbestos or another hazardous material are disturbed during the work, all work shall stop until the area is contained, the hazard evaluated by a qualified professional and the hazardous materials, if indeed present, is safely managed by a qualified contractor.

2.0 INTRODUCTION

North West Environmental Group Ltd. was retained by Public Works and Government Services Canada Environmental Services on behalf of Correctional Service Canada (CSC) to conduct a Hazardous Materials Assessment Survey on the Administration Building located within William Head Institution, Correctional Services Canada.

The purpose of the assessment was to assess for the presence (or absence) and estimated extent of hazardous building materials within the subject building in accordance with the requirements of the Canada Labour Code, Part II (Canada Labour Code) and the current version of British Columbia`s Occupational Health & Safety Regulation (BC Reg. 296/97).

The hazardous building materials considered during this assessment included asbestos containing materials (ACMs), lead, including lead-containing paints (LCPs), polychlorinated biphenyls (PCBs) in equipment and paint, microbiological (mould, moisture or rodent waste) affected building materials, mercury, ozone depleting substances (ODS's) and silica.

Julie Scott-Moncrieff (BSc.) and William Roff (BSc.) of North West Environmental Group Ltd. conducted a visual assessment within the subject building on March 18th, 19th and 20th, 2015. Site work was conducted in general compliance with the requirements of the Canada Labour Code, BC Reg. 296/97 and North West's Safe Work Practices (SWPs).

Work Program

The following was undertaken:

- A building survey was conducted on a room by room basis to determine the presence, location, quantity and condition of selected hazardous materials including asbestos, mould, polychlorinated biphenyls (PCB) containing equipment, hantavirus, silica and lead;
- Analysis of asbestos samples were performed by North West Environmental Group Ltd. NWEG is a proficient laboratory per the American Industrial Hygiene Association (AIHA) Bulk Asbestos Proficiency Analytical Testing (BAPAT) program.
- A report created detailing the results, conclusions and recommendations as well as an abatement cost estimate, if necessary.

3.0 BACKGROUND

The subject multi-story building was reportedly constructed in 1975 and has undergone multiple renovations. The reported date of construction is consistent with those dates when hazardous building materials were commonly used and/or may be present including but not limited to ACMs, LCPs, PCBs, microbial contamination, mercury, ODSs, and silica.

North West Environmental Group Ltd. understands that an HVAC upgrade project is proposed for the subject building, the scope of which is still being determined. As a measure of diligence in maintaining compliance with federal and provincial regulations pertaining to the identification of other hazardous materials within the subject building prior to renovation activities, PWGSC commissioned this assessment.

All accessible areas of this building were inspected for the presence of asbestos-containing materials, mould, lead, radioactive sources, ozone depleting substances, mercury, and PCBs. Where appropriate, representative samples of materials suspected of containing asbestos or other hazardous materials were collected and sent for confirmatory testing.

Removal of hazardous materials must be undertaken by a qualified contractor employing WorkSafeBC approved procedures. If materials are encountered during deconstruction that differ from, or are in addition to those described in this report, then work must stop until the material content can be determined and appropriate precautionary measures employed to protect workers and others at or near the worksite.

4.0 HAZARDOUS MATERIALS REGULATION AND METHODOLOGY

As per Labour Canada and WorkSafeBC mechanical systems, structures and finishes of the subject building were visually examined to determine the suspected presence of:

- Asbestos
- Polychlorinated biphenyls (PCB)
- Mercury
- Hantavirus – rodent droppings
- Radioactive Materials
- Urea Formaldehyde Foam Insulation (UFFI)
- Ozone Depleting Substances (ODS)
- Above Ground Storage Tanks (AST)
- Arsenic
- Silica
- Mould

Where building materials were suspected but not confirmed to contain asbestos or lead, samples were collected for analysis to confirm or deny the presence of these hazardous materials. Based on the analytical results, visually similar materials were referenced to specific analyzed samples to reduce the number of samples collected.

Additional background information and the methodology used for the determination of the presence or absence of each specific hazardous material considered in this assessment are outlined in the following sections.

4.1 Asbestos

Projects that will result in the disturbance of asbestos-containing materials (ACMs) must satisfy WorkSafeBC's regulations and conform to the guidance document Safe Work Practices for Handling of Asbestos. WorkSafeBC's Occupational Health and Safety Regulation defines an asbestos-containing material as "any manufactured article or other material which contains at least 0.5% per cent or more asbestos by weight at the time of manufacture, or which contains at least 0.5% per cent or more asbestos as determined by NIOSH Analytical Method 9002 (dispersion staining, polarized light microscope) or x-ray diffraction or vermiculite insulation with any asbestos.

Based on these criteria, multiple samples were collected from each "homogenous application" of an observed suspected ACM (materials suspected to contain asbestos that are uniform in material type, colour, texture application and estimated installation date) and submitted to North West Environmental Group Ltd. Victoria Laboratory for analysis of asbestos content using Polarized Light Microscopy (PLM) with dispersion staining, in accordance with the US Environmental Protection Agency (EPA) 600/R-93/116 Method "Method for the Determination of Asbestos in Bulk Building Materials". The number of samples to be collected for each homogeneous application of a suspected ACM was based on the recommendation provided by WorkSafeBC publication "Safe Work Practices for Handling Asbestos (2012), along with the assessor's experience and understanding of the consistency of that building material's application.

The asbestos-containing material can also be characterized as friable and non-friable. Friable asbestos "means any material which, when dry, can be easily crumbled or powdered by hand pressure, or a material that is crumbled or powdered" as defined under the BC Occupational Health and Safety Regulation. The condition of the asbestos and classifications would be used in assessing the level of action required with respect to re-use of the building.

Worker exposure to asbestos fibres is also regulated by the BC Occupational Health and Safety Regulation. The WorkSafeBC eight-hour TWA for asbestos fibres (all forms) is 0.1 fibre/cm^3. Exposure to these substances must be kept as close to zero as is reasonably practicable.

Representative bulk samples are collected in accordance with NIOSH Analytical Method 9002 and the WorkSafeBC guideline document, Safe Work Practices for Handling Asbestos. Representative bulk samples were collected of accessible suspect ACMs in sufficient quantities for laboratory analyses.

Suspect ACM samples were sealed in polyethylene zip-lock bags labeled with the sample number, suspect material description, and sample location. As part of the sampling procedures, sampling tools were cleaned between sample collection events to avoid the potential for cross-contamination of samples. Sample bags ere complied in order and placed into a single container accompanied with a Chain of Custody form outlining the project information, date, building location, number of samples, and sample description. Samples were submitted to the analytical laboratory in a sealed container.

Asbestos is designated as an 'ALARA' substance whereby worker exposure to this product must be kept "**A**s **L**ow **A**s **R**easonably **A**chievable". Employers are required under Section 5.54 (Exposure control plan) of the Occupational Health and Safety Regulation (OHSR) to develop an exposure control plan (ECP) when workers are or may be exposed to airborne concentrations of these materials in excess of 50% of the exposure limit.

4.2 Polychlorinated Biphenyls (PCB)

Polychlorinated biphenyls (PCB) were used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. In fluorescent fixtures, PCBs were usually found within the small capacitors inside the ballast that controls the lamp. The PCB Regulations, SOR/2008-273, prohibited the use of PCBs in electrical equipment manufactured after July 1, 1980.

PCBs are regulated under both federal (Canadian Environmental Protection Act) and BC Hazardous Waste Regulation and must be treated as PCB waste and be stored and disposed of accordingly.

The presence of PCB-containing equipment was assessed through visual means.

The total number of fluorescent lamp ballasts than may contain PCBs within the subject building was counted and results can be found in Section 5.

Each fluorescent light fixture removed during renovation or demolition should have the ballast checked to determine if it contains PCB. Ballasts containing PCB must be removed, sorted and transported to a licensed facility. Although rare, paints have been known to contain PCBs.

4.3 Mercury

Mercury is commonly found in buildings as mercury vapour lighting, thermostats/thermometers with mercury-containing glass ampoules, electrical switches and can also be found in minor amounts in fluorescent lamp tubes and vapour bulbs and may be present in stable forms in adhesives.

Mercury is hazardous substance, and any maintenance or abatement involving materials containing mercury or mercury compounds must be done in compliance with the BC Occupational Health and Safety Regulations (BCOHSR BC Reg. 296/97).) and Canada Labour Code.

Employers with workers who have a risk of exposure must have an exposure control plan (ECP) in place prior to allowing their workers to come into contact with this material. As with all other hazardous substances, all personnel working around or with such materials must be made aware of their presence and be supplied with training in the potential health effects and means of avoiding exposures.

As a hazardous substance, transportation and disposal of this substance must be done in compliance with the federal Transportation of Dangerous Goods (TDG) Regulations and the BC Hazardous Waste Regulation. Mercury is found in fluorescent light bulbs, thermostats, manometers, and equipment such as electrical switches.

Mercury is designated as an ALARA substance whereby worker exposure to this product must be kept "as low as reasonably achievable". Employers are required under Section 5.54 (Exposure control plan) of the Occupational Health and Safety Regulation (OHSR) to develop an exposure control plan (ECP) when workers are or may be exposed to airborne concentrations of these materials in excess of 50% of the exposure limit.

The presence of mercury and mercury-containing equipment was assessed through visual means.

4.4 Lead

Lead may be used in its pure metallic form or combined chemically with other elements to form lead compounds. Metallic lead is used to make products such as lead solder, pipes, sheaths for electric cables, radiation shields, and electric storage batteries. Lead is commonly found in buildings in the solder used on copper domestic pipes, in caulking on bell fittings of cast iron drainage pipes and in electrical equipment.

The presence of lead-containing materials (other than paint was assessed through visual means.

With respect to paints, they often contain heavy metals as pigments and/or preservatives. Under specific circumstances, persons may be exposed to these metals by ingestion, skin absorption and/or inhalation.

Most buildings built before 1950 have had lead-based paint applied to the interior or exterior surfaces. Often lead paint of this era contained up to 40% lead by weight. Paints made between 1950 and 1978 usually contained smaller amounts of lead. Paints often contain other heavy metals including mercury, arsenic and chromium.

Other than during the application process, the primary mechanism of exposure for workers would be the inhalation of dusts through activities such as sanding, scraping, drilling, crushing, heating, burning or other processes likely to damage the coatings themselves. Paints containing heavy metals pose little risk to workers when in good condition and when undisturbed.

In 2005 the federal *Surface Coating Materials Regulation* was amended to reduce this threshold from 5,000 mg/kg to 600 mg/kg and then to 90 mg/kg in 2010. As paints under this concentration of lead are acceptable for use in residential settings today, such coatings do not pose a significant hazardous material issue unless rendered airborne within a worker's breathing zone by fine dust generating processes.

With respect to potential lead exposures associated with disturbance to surfaces coated with lead-containing products, WorkSafeBC has compiled a manual "Lead-Containing Paint and Coatings: Preventing Exposure in the Construction Industry". Lead Guideline which defines a "lead-containing

surface coating materials". If a worker is, or may be, exposed to potentially harmful levels of lead, the employer must ensure that a risk assessment is conducted by a qualified person. Where a worker may be exposed to airborne lead concentrations in excess of 50% of the exposure limit of 0.05 mg/cu.m or where exposure through any route of entry could cause elevated blood levels, the employer must develop and implement an exposure control plan (ECP) which meets the requirements of section 5.54 of the BC Occupational Health and Safety Regulation. As an ALARA substance, worker exposure must be kept as low as reasonably achievable.

Appropriate precautions for protecting workers from lead exposure should be implemented during any work involving lead or lead paint including the use of personal protective equipment, localized ventilation and/or dust suppression methods.

Note that lead residue on "cleaned" structural steel (from which lead-containing coatings have been removed) should not exceed 40 ug/sf prior to welding, cutting or burning.

Figure 4.1: Recommended lead clearance criteria for surfaces

	Floor	Sill/ledge	Trough
Residences, schools, daycare centres, and other public buildings	0.43 mg/m^2 (40 µg/ft^2)	2.7 mg/m^2 (250 µg/ft^2)	4.3 mg/m^2 (400 µg/ft^2)
Commercial buildings, including retail stores, offices (administrative), and laboratories (other than lead assay laboratories)	2.2 mg/m^2 (200 µg/ft^2)	5.4 mg/m^2 (500 µg/ft^2)	8.6 mg/m^2 (800 µg/ft^2)

Reference: WorkSafeBC, Lead-Containing Paints and Coatings – Preventing Exposure in the Construction Industry, 2011

Samples of suspected LCPs were collected from major paint applications, and were collected to substrate, where possible, in sufficient quantity to conduct analyses for total lead content. Samples collected were placed into separate, sealed and labeled polyethylene bags, and submitted to EMSL for analyses of total lead content using Flame Atomic Absorption Spectrometry AAS (SW 846 3050B* / 7000B)

As per the British Columbia Hazardous Waste Regulation (BC Reg.63/88), lead waste may be considered a toxic leachate if lead is in a dispersible form and its leachate contains greater than 5.0 milligrams per Litre (mg/L) lead.

Paint chips can be hazardous wastes if they contain leachable components that when subjected to the *Toxicity Characteristic Leaching Procedure (TCLP, US EPA Method 1311)* leach out levels of contaminant in excess of those published in Table 1 of *Schedule 4* of the *BC Hazardous Waste Regulation*. Wastes deemed to be hazardous wastes must be disposed through a waste disposal contractor licensed by the Province.

4.5 Hantavirus – Rodent Droppings

The Hantavirus is a virus associated with Hantavirus Pulmonary Syndrome, a disease caught through contact with the urine or droppings, or by being bitten or scratched by infected rodents. The disease starts off like a cold or flu (fever, sore muscles, headaches, nausea, vomiting), but progresses to pneumonia-like conditions within a few days. The change in intensity of the symptoms is very rapid and can result in fluid build-up in the lungs and respiratory failure.

Hantavirus is a hazardous substance and as such is regulated under the BC Occupational Health and Safety Regulation. Employers with workers who have a risk of exposure must have an exposure control plan in place prior to allowing their workers to come into contact with this material. As with all other hazardous substances, all personnel working around or with such materials must be made aware

of their presence and be supplied with training in the potential health effects and means of avoiding exposures.

Based on the above, the visual assessment included making note of the presence or absence of rodent droppings on surfaces.

4.6 Radioactive Materials

Many buildings contain smoke alarms which contain small sealed radioactive sources in the form of ^{241}Americium. The Canadian Nuclear Safety Commission (CNSC) and the Canadian Nuclear Safety Act regulate radioactive materials. These materials are sealed into a metal case within the smoke detector and must not be damaged or tampered with. Smoke detectors intended for disposal must be handled in accordance with CNSC regulations.

The presence of radioactive materials was assessed through visual means.

4.7 Urea Formaldehyde Foam Insulation

Urea Formaldehyde Foam Insulation (UFFI) was banned in 1978. All such material was to have been removed and replaced. Standard real estate agreements currently contain a "No UFFI" clause and as a best management practice, all buildings containing UFFI should have the material removed. UFFI is still found in many buildings in BC.

The presence of UFFI was assessed through visual means.

4.8 Ozone-depleting Substances (CFCs/ODS)

Chlorofluorocarbons (CFCs) are ozone-depleting substances (ODS) and a type of halocarbon. ODS are regulated by the Canadian Environmental Protection Act under the Ozone-Depleting Substances Regulations 1998 SOR/99-7 and the Federal Halocarbon Regulations (FHR) SOR/2003-289. Compounds that contain only chlorine, fluorine and carbon are called CFCs. These materials are used in air conditioning or other refrigeration systems and in fire suppression systems. The other main refrigerants are hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs) and blends of fluorocarbons (designated by "R").

ODSs are regulated in BC by the British Columbia Waste Management Act – Ozone Depleting Substances and Other Halocarbons Regulation (BC Reg. 387/99 as amended by BC Reg. 109/2002) and the Federal Halocarbon Regulations, 2003-289. While the regulations allow the continued use of halocarbon refrigerants, they strictly prohibit any person from releasing into the environment any halocarbon.

In the case of demolition, these materials will require proper recovery and disposal. The BC Ozone-Depleting Substances Regulations and FHR would also apply to any CFC/ODS abatement procedures. These regulations require that all ODS must be collected, stored and recycled, or collected and disposed appropriately by a licensed professional.

The presence of ODSs and equipment containing these materials was assessed through visual means.

4.9 Aboveground / Underground Storage Tanks

Storage tanks containing fuels have the ability to leak over time and can result in soil and groundwater contamination. These tanks must be observed and checked over time to ensure they do not leak. Evidence of leaks must be investigated and any potential contamination remediated. The Canadian Council of Ministers of the Environment (CCME) publishes a Code of Practice for the safe management

of aboveground and underground storage tanks (Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulation – SOR/2008-197).

The presence of storage tanks was assessed through visual means.

4.10 Arsenic

Arsenic is hazardous substance, and any maintenance or abatement involving materials containing arsenic or arsenic compounds must be done in compliance with the BC Occupational Health and Safety Regulations (BCOHSR).

Employers with workers who have a risk of exposure must have an exposure control plan in place prior to allowing their workers to come into contact with this material. As with all other hazardous substances, all personnel working around or with such materials must be made aware of their presence and be supplied with training in the potential health effects and means of avoiding exposures.

Arsenic has long been used as a pesticide due to its toxic properties. Arsenical pesticides, often in the form of chromated copper arsenate (CCA), when applied with high pressure to wood, serve to extend the structural life of the material by making it resistant to mould, rot and insect infestation. Studies have shown that these materials have the ability to leach arsenic into the soil. Arsenic may also be found in paints. Although wood and wood dusts contaminated with arsenical pesticides do not require specialized disposal in BC, care must be exercised to minimize the potential for worker exposure to these materials through direct skin contact or through inhalation of dusts and fumes.

The presence of arsenic in pressure treated wood was assessed through visual means.

4.11 Silica

Silica is a hazardous substance and as such is regulated under the BC Occupational Health and Safety Regulation. Silica, also referred to as free crystalline silica, is found in concrete, cement, mortar, ceramic wall and floor tiles, drywall, plaster, stucco finishes and acoustic ceiling tiles. Exposure to silica dust is governed by BC Reg. 296/97 According to both legislative instruments, the time weighted average exposure limit for airborne silica dust is 0.025 mg/m cu. Airborne exposure criteria, respirator requirements and mandatory worker testing requirements are also outlined under this regulation. As with all other designated substances, all personnel working around or with such materials must be made aware of their presence and be supplied with training in the potential health effects and means of avoiding exposures.

Employers with workers who have a risk of exposure must have an exposure control plan in place prior to allowing their workers to come into contact with this material. As with all other hazardous substances, all personnel working around or with such materials must be made aware of their presence and be supplied with training in the potential health effects and means of avoiding exposures.

Crystalline silica dust can cause a disabling, sometimes fatal disease called silicosis. The fine particles are deposited in the lungs, causing thickening and scarring of the lung tissue. The scar tissue restricts the lungs' ability to extract oxygen from the air. This damage is permanent, but symptoms of the disease may not appear for many years.

Employers have a duty to protect their workers from silica dust exposure on construction projects. Studies show that when common construction work tasks involving the sanding, drilling, chipping, grinding, cutting, sawing, sweeping, and blasting of concrete and concrete products are conducted without using dust controls, workers are exposed to airborne silica concentrations at levels far above the occupational exposure limits.

Crystalline silica is an ALARA whereby worker exposure must be kept "as low as reasonably achievable". Employers are required under Section 5.54 (Exposure control plan) of the Occupational Health and Safety Regulation (OHSR) to develop an exposure control plan when workers are or may be exposed to airborne concentrations of this materials in excess of 50% of the exposure limit.

The presence of silica was assessed through visual means.

4.12 Mould

Within the BC Occupational Health and Safety Regulations, there are no established permissible exposure levels for mould spores in air. This means that there are no published concentrations above which worker exposure is deemed to be hazardous and under which workers would not need respiratory protection. WorkSafeBC does, however, provide guidance on protocols for protecting workers from the hazards of airborne mould and bacteria within the section(s) of the Regulation guidelines addressing Indoor Air Quality.

Various other guidelines are provided for addressing mould in Canada including:

- The Institute of Inspection, Cleaning and Restoration and Certification (IICRC) standard S500 governing both water damage restoration and entitled: Standard for Professional Water Damage Restoration – S500. This document is approved by the American National Standards Institute (ANSI)
- Health Canada: Fungal contamination in public buildings: A guide to recognition and management, 1995
- Health Canada. Fungal Contamination in Public Buildings: Health Effects and Investigation Methods, 2004
- Standard Construction Document CCA 82 "Mould Guidelines for Canadian Construction Industry". Canadian Construction Association, 2004 (referred to as "CCA 82").

These guidelines also state that any non-porous (metal, glass and hard plastics) and semi-porous (wood and concrete) materials that are structurally sound and visibly mouldy can be cleaned and re-used. However, porous materials such as ceiling tiles, wallpaper, insulation, drywall, and sometimes carpets with more than a small area of contamination should be removed and discarded.

The presence of suspect visible mould was assessed through visual means.

5.0 FINDINGS & RECOMMENDATIONS

As per WorkSafeBC requirements, the building was surveyed for the presence of several different types of hazardous materials including:

- Asbestos
- Polychlorinated biphenyls (PCB)
- Mercury
- Hantavirus – rodent droppings
- Radioactive Materials
- Urea Formaldehyde Foam Insulation (UFFI)
- Ozone Depleting Substances (ODS)
- Above Ground Storage Tanks (AST)
- Arsenic
- Silica
- Mould

5.1 Asbestos

Bulk Samples

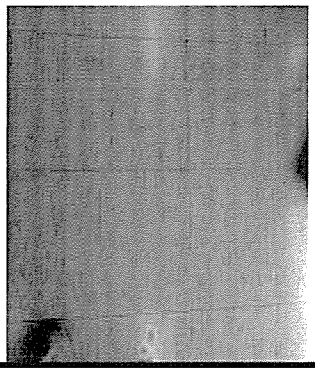
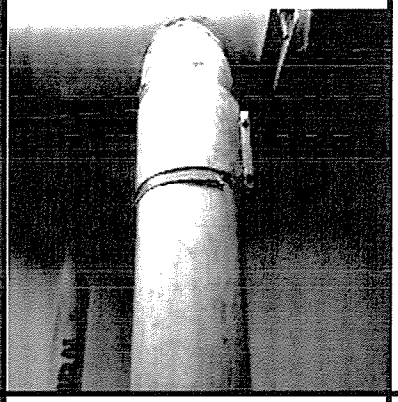
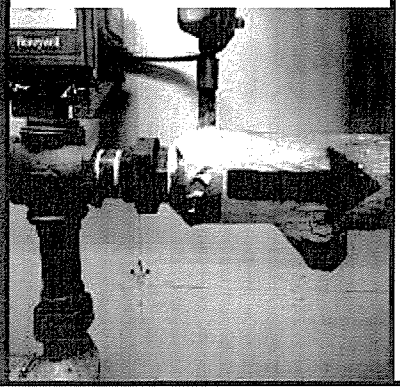
All accessible areas of the building were inspected for the presence of building materials suspected of containing asbestos and sampled where appropriate and analysed for the presence of asbestos fibres.

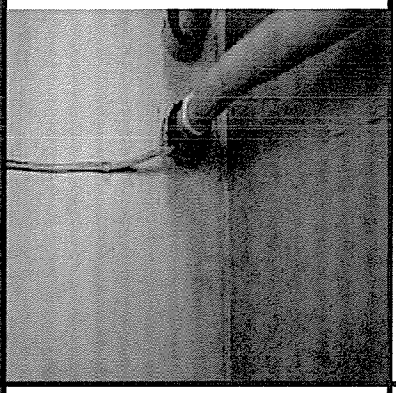
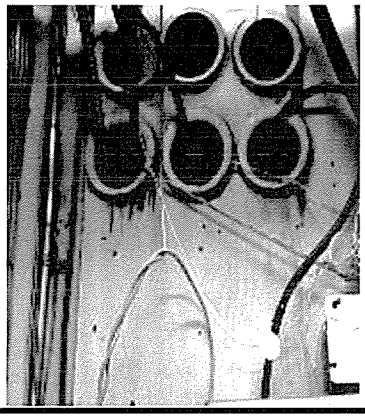
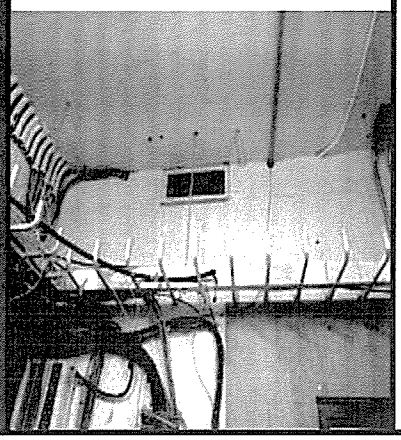
North West Environmental Group Ltd. Laboratory is accredited through Bulk Sampling Analysis PAT Program.

Thirty Seven (37) bulk samples of building materials suspected of containing asbestos were collected from a number of areas in the building in accordance with WorkSafeBC requirements. Bulk samples were analyzed for asbestos using method: EPA/600/R- 93/116 "Bulk Asbestos Analysis by Polarized Light Microscopy".

Concrete block coring was conducted (See Section 6.0 for detailed locations). No vermiculite insulations were identified.

Table 5.1: Summary of Identified ACMs – Administration Building

Location and Material Type	Asbestos Containing Material	Condition	Friability	Potential Risk Level for Airborne Asbestos Fibres*
Throughout Main Floor, including under cabinets and millwork. **Floor Tile Type 1** **12`x12``** **Cream with streaks.** **3% Chrysotile**		Good	Non Friable	Moderate
Boiler Room **Heat Shield** **On Boiler Exhaust** **40% Chrysotile**		Good	Friable	Moderate
Boiler Room **Gasket** **On Boiler return water line** **40% Chrysotile**		Good	Non Friable	Moderate

Location and Material Type	Asbestos Containing Material	Condition	Friability	Potential Risk Level for Airborne Asbestos Fibres*
Throughout building **Pipe penetrations** **Black** **20% Chrysotile**		Good	Non Friable	Moderate
Throughout building **Pipe penetrations** **Dark Red** **3% Chrysotile**		Good	Non Friable	Moderate
Throughout building **Ductwork penetrations** **Grey** **5% Chrysotile**		Good	Non Friable	Moderate

Limited sampling of the roof membrane was carried out to prevent damage to the building envelope. Additional sampling will need to be undertaken prior to the commencement of any roofing work.

Note: any additional suspect materials encountered during renovation or demolitions activities must be left undisturbed until testing determines the presence or absence of asbestos or other hazardous material. In the event they are damaged or otherwise impacted, all work shall stop until appropriate control can be put in place to protect workers and the public.

5.2 Polychlorinated Biphenyls (PCB)

Fluorescent light fixtures were observed and appeared to be of a vintage often found to contain ballasts which may contain PCBs. Environment Canada (EC) has developed a guideline called - *Identification of Lamp Ballasts Containing PCBs –Environment Canada 1991*. Fluorescent lamp ballasts removed during renovations or demolition should be assessed in reference to the PCB Guide.

PCB-containing items identified for removal and disposal should be handled, transported, sorted and disposed of according to the Federal Transportation of Dangerous Goods Regulation, BC Reg.63/88 and the PCB Regulations (SOR/2008-273).

Manufacturers of ballasts and capacitors use distinct catalogue and date codes to identify their product, its date of manufacture, and, for some capacitors, its dielectric fluid. Fluorescent lamp ballasts are usually mounted between the fluorescent tubes on the light fixture and are shielded with a metal protective device which reduces heat radiation. Due to the fact the covers are easily broken and the risk of electrical shock when accessing the ballast, it is standard practice to make the observation that there is a potential for PCBs to be present and have the ballasts inspected prior to disposal.

Paints were not tested for PCB content.

5.3 Mercury

Mercury-containing thermostats were not observed within the building.

Mercury is also found in fluorescent light tubes. Fluorescent light tubes removed during renovation /or demolition activities, ensure all mercury waste is handled, stored, recycled and/or disposed of in accordance with the requirements of BC Reg.63/88 and the Federal Transportation of Dangerous Goods Regulation.

Caution should be exercised to ensure light tubes are not broken, releasing droplets of mercury.

5.4 Lead

5.4.1 Lead Paint

Three (3) paint samples from the building were analyzed for lead content.

A summary of the sample types, locations and analytical results is shown below in Table 5.2

Lead was found in the sample of paint collected from the concrete wall in the subject building (0.040% by weight).

The sample was confirmed to exceed the concentration of lead permissible in new paint (0.009% - SCMR) threshold to be sold without notifying the consumer of its lead content.

A copy of the certificate of analysis provided by EMSL for the suspected LCP samples submitted is in Appendix 4.

The paint on surfaces throughout the building was generally observed to be in good condition (not flaking, peeling or delaminating from surfaces significantly) at the time of the assessment.

For LCPs and lead-containing materials that are to be disturbed and/or removed during demolition activities, including paint chip debris that is created during the renovation or demolition process ensure compliance within the following:

- The occupational exposure control requirements of the Canada Labour Code and BC OH&S Reg., including the provision for the Lead Guideline,

- The disposal requirements of the British Columbia Hazardous Waste Regulation (BC Reg. 63/88),
- The Transportation requirements of the Federal Transportation of Dangerous Goods Regulation.

Corrective action or remedial work on paint applications containing any concentration of lead should be undertaken in a manner so as to avoid generating fine particulate matter or dust (i.e. avoid sanding). Airborne lead dust or fumes should not exceed BC Reg. 296/97 8-hour Occupational Exposure Limit (OEL) of 0.05 milligram per cubic metre during the removal of paints and products containing any concentration of lead. The use of personal protective equipment is recommended to reduce the potential for over-exposure to lead dust.

Table 5.2 Paint Chip Sampling Results

Sample	Description	Lead (%) by Weight	Lead mg/kg
24717-29	125/129 – Paint Chips on Wall	<0.010*	<100
24717-31	**Room 121 – Concrete Wall**	**0.040**	**400**
24717-39	Exterior – Brown Paint off Soffit	<0.010*	<100

***"<" means the result was below the detection limit for the method (Atomic Absorption) of 100 mg/kg which means their actual concentration could be above the SCMR limit for lead paint (90-100 mg/kg) or below 100 mg/kg.**

5.4.2 Elemental Lead

Lead within the copper water pipes/fittings was not tested for lead content however lead content in solder, especially from buildings of this vintage, is known to reach levels up to 98% lead.

If lead materials are found they are typically recognized as having significant salvage value, disposal therefore should not be a major concern. Workers should exercise caution if heat is to be used to melt any lead found as means of facilitating its extraction. Molten lead can produce significant quantities of inhalable lead fume which can pose a severe health hazard. The BC Occupational Health and Safety Regulation require that worker exposure to airborne lead be kept below 0.05 mg/m^3.

5.5 Hantavirus – Rodent Droppings

Rodent droppings were not observed in the building during the survey.

If rodent droppings are discovered during planned work, the contractor must provide worker instruction on the hazards of rodent droppings and other biohazardous materials, including the types of respirators and protective clothing to be worn. Disposable protective clothing e.g. Tyvek suits, respiratory protection e.g. Half or full face air purifying respirator with HEPA or P100 cartridges and appropriate decontamination procedures would be recommended to control exposure to particles generated by disturbance of rodent droppings.

5.6 Radioactive Materials

Smoke detectors containing sealed ^{241}Americium sources were observed in the building.

If smoke detectors are encountered at slab height above the T-bar grid they may be removed during the demolition and/or renovations should be collected and disposed in accordance with Canadian

Nuclear Safety Commission regulations. Alternatively, if still functional, they may be reused for their original intended purpose.

Radon was not tested for as it was beyond the scope of this project

5.7 Urea Formaldehyde Foam Insulation

No sampling was undertaken for Urea Formaldehyde Foam Insulation (UFFI) as materials suspected of containing UFFI were not observed in the building.

5.8 Ozone-depleting Substances (CFCs/ODS)

Equipment (Refrigerator and Freezer) that may use chlorofluorocarbons (CFCs) or ozone-depleting substances (ODS) was observed in the building.

In the case of demolition, these materials will require proper recovery and disposal. The BC Ozone-Depleting Substances Regulations and FHR would also apply to any CFC/ODS abatement procedures. These regulations require that all ODS must be collected, stored and recycled, or collected and disposed appropriately by a licensed professional.

Table 5.3 Ozone-depleting Substances Summary

Hazardous Material/Location	Type		
Appliance	Model	Serial Number	Refrigerant
Lunch Room Air Conditioner	A801C2	J941801410	R-22
Lunch Room Refrigerator	FCM 9DMB WH	SF175112	R134a
Refrigerator Canteen	DFF8805W	MD910625	R134a

5.9 Aboveground Storage Tanks

An aboveground storage tank was not observed near the areas of the site where the planned work will be undertaken.

5.10 Arsenic

Wood likely to have been preserved with arsenical pesticides was not observed on the subject site.

Although wood and wood dusts contaminated with arsenical pesticides do not require specialized disposal in BC, care must be exercised to minimize the potential for worker exposure to these materials through direct skin contact or through inhalation of dusts and fumes. Caution must be taken to ensure this material is not burned or composted if removed during renovation or demolition.

5.11 Silica

Testing for crystalline silica in dust was not completed/conducted as part of this survey however it is known to be a component of concrete dust. Concrete, cement, mortar, drywall, plaster, ceramic tiles, floor tiles, stucco and any other cementitious materials are suspected of containing silica in crystalline

and non-crystalline forms. Many of the removal techniques (grinding, cutting, chipping etc.) for these materials can generate high levels of crystalline silica in the air.

When silica-containing material are to be removed during renovations or demolition activities, ensure dust control measures are employed such that airborne silica dust concentrations do not exceed the exposure limits as stipulated by BC Reg. 296/97 (0.025 mg/cu.m.). This would include but not limited to the following:

- Providing workers with respiratory protection.
- Use wetting techniques and/or HEPA equipped extraction systems attached to drills and other power equipment where possible in order to decrease dust levels.
- Providing workers with the facilities to properly wash prior to exiting the work area.
- Providing dust control to mitigate the potential for silica dust to escape from the work area into public and /or adjacent areas.

5.12 Mould

Suspect visible mould was not observed within the building

If mould is encountered during demolition or renovation, work should stop and a risk assessment per WorkSafeBC Guidelines G4.79 (Moulds and indoor air quality) must be conducted (Table 5.3).

Table 5.4 Guide for Removing Visible Mould Growth in the Indoor Environment

Extent of Visible and Hidden Mould Growth (surface area)	Minimum Recommended PPE[1]	Control Measures to Prevent Dust or Spore Dispersion[2]
Small Total surface area affected is less than 1 square metre (10 square feet)	N95 respirator or half facepiece respirator with HEPA filters, gloves, and goggles.	Isolation of the work area; wet wiping or misting of surfaces with water containing a surfactant (wetting agent); and the use of drop sheets to prevent dispersion of dust and spores. Material is removed with minimum of dust and spore dispersal and placed in a plastic bag and sealed.
Medium Total surface area affected is between 1 square metre and 10 square metres (10 square feet to 100 square feet)	N95 respirator or half facepiece respirator with HEPA filters, gloves, disposable coveralls, and goggles.	Limited containment: use polyethylene sheeting ceiling to floor around the affected area with a slit entry and covering flap. Maintain area under negative pressure with HEPA filtered negative air unit. Block supply and return air vents within the containment area.
Large Total surface area is greater than 10 square metres (100 square feet) or the potential for increased occupant or remediator exposure during remediation is estimated to be significant.	Full face piece or powered air purifying respirator (PAPR) with HEPA filters, gloves, disposable coveralls (covering head and boots), and goggles.	Full containment: use of critical barriers. Maintain area under negative pressure with HEPA filtered fan unit exhausted outside the building. Block supply and return air vents within the containment area. Provide facilities and procedures for decontamination and personal hygiene.

6.0 ROOM BY ROOM ASSESSMENT

Following is a room-by-room review of the building, including sampling and analysis.

Room: All perimeter

Details:

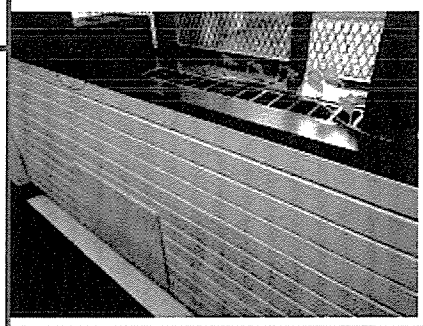
Perimeter rooms have an electric heater along the exterior walls. These were inspected locations to see if there were any asbestos or other hazardous materials present.

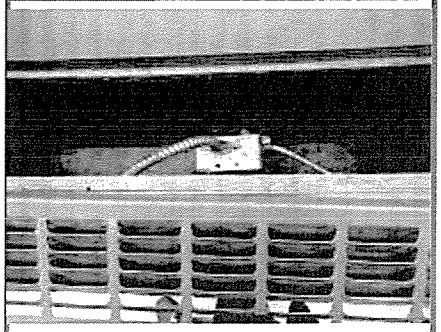
Electric Heating:
Finned elements, heat provided by natural convection currents through top grill.

All appeared to be plywood boxes with aluminum grills as in pictures to the right

HazMat present:
None observed

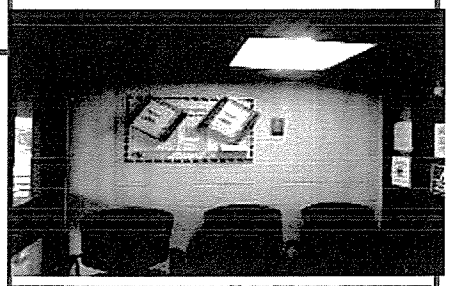
Samples:





No samples collected-no hazmat observed

Room: 102 Entrance



Details:

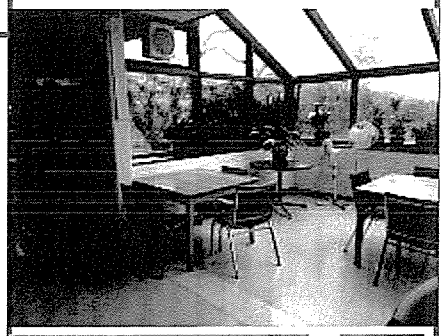
Ceiling: Wood
Walls: Concrete, Concrete Block
Flooring: Concrete

HazMat present:
PCB: 3 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in concrete and concrete blocks
Mercury: Mercury vapour in fluorescent light tubes

Samples:

No samples collected

Room: 103/124/126 Visiting Room and Sun Room



Details:

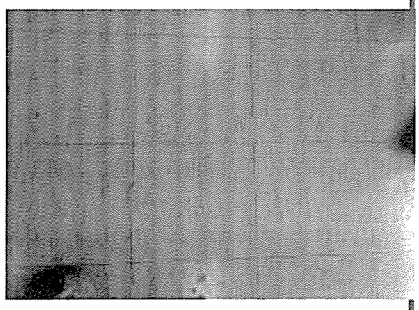
Ceiling: Drywall Joint Compound
Walls: Concrete Block,
Flooring: **Floor Tile Type 1 (12x12 cream streaked) contains asbestos**

HazMat present:

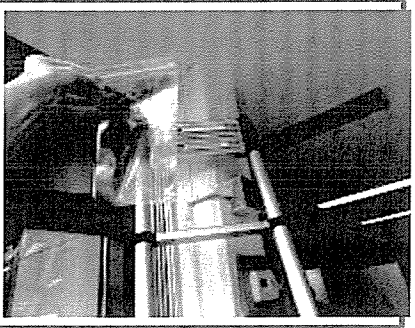
Asbestos: **Floor tiles contain asbestos, insulated piping may be concealed in drywall ceiling**
PCB: 23 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks
Mercury: Mercury vapour in fluorescent light tubes

Samples:

01 and 02 – Brown Window caulking; no asbestos detected



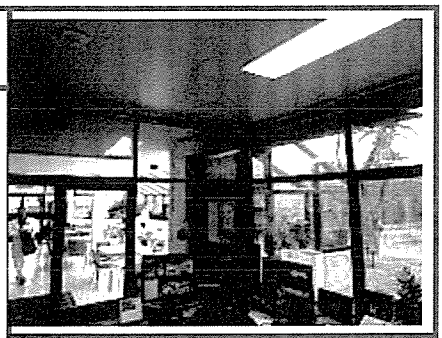
03 – Floor tile Type 1 12"x12" cream streaked Contains 3% Chrysotile

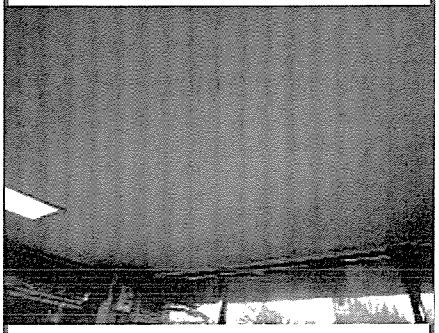


4 and 20 - Drywall Joint Compound; no asbestos detected

Comments:
Heaters by windows-no suspect materials observed

Room: 104 V&C Office





Details:

Ceiling: Drywall Joint Compound
Walls: Concrete Block, Wood
Flooring: **Sheet Flooring Type 1 –Beige Cloudy**

HazMat present:

Asbestos: Assume asbestos containing Floor tiles underneath sheet flooring, Insulated piping may be concealed in drywall ceiling

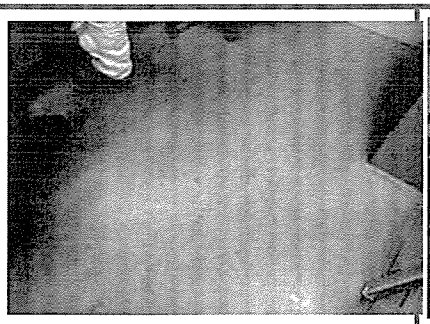
PCB: 4 light fixtures present, ballasts may contain PCBs

Lead: Assume present in paint/surface coatings

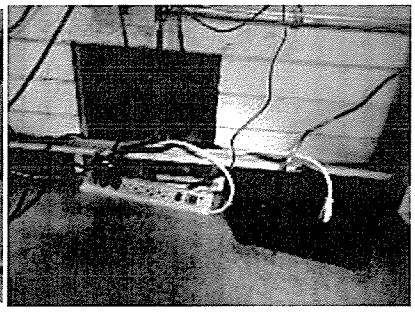
Silica: assume present in drywall joint compound and concrete blocks

Mercury: Mercury vapour in fluorescent light tubes

Samples:



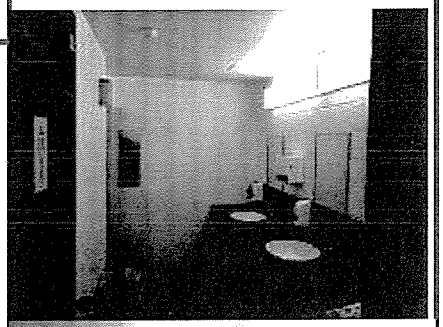
05 – Sheet flooring Type 1- Beige Cloudy; no asbestos detected

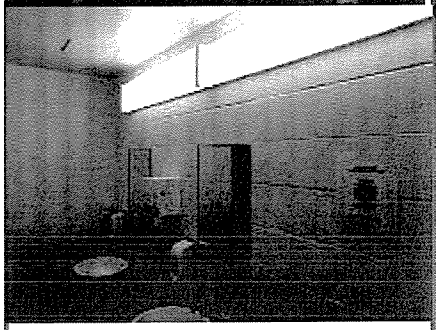


06 – Baseboard (Brown) no asbestos detected

Comments:
Heaters by windows-no suspect materials observed

Room: 106 Women's Washroom





Details:

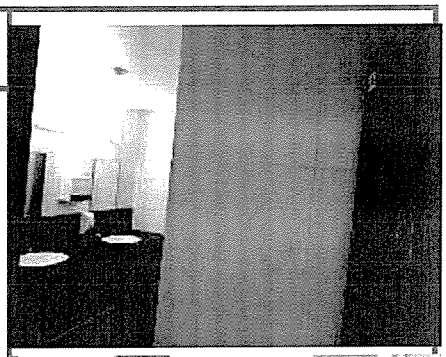
Ceiling: Drywall Joint Compound
Walls: Concrete Block, Wood
Flooring: Ceramic Floor tile

HazMat present:
Asbestos: Insulated piping may be concealed in drywall ceiling
PCB: 3 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks
Mercury: Mercury vapour in fluorescent light tubes

Samples:

No samples collected

Room: 107 Men's Washroom



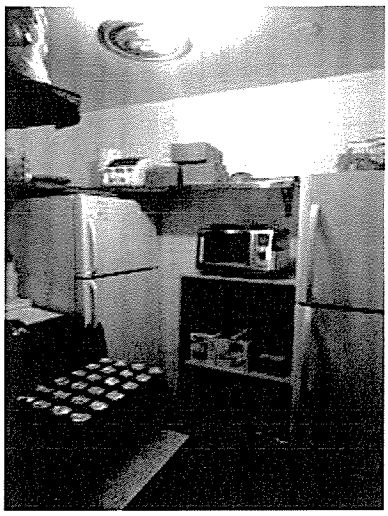
Ceiling: Drywall Joint Compound
Walls: Concrete Block, Wood
Flooring: Ceramic Floor tile

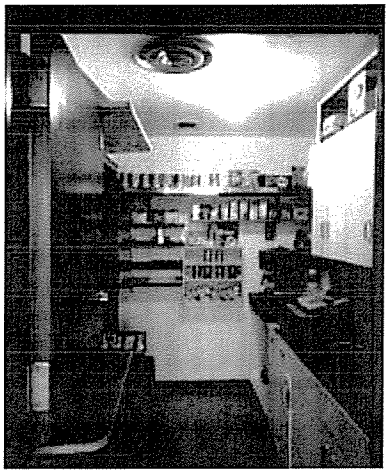
HazMat present:
Asbestos: Insulated piping may be concealed in drywall ceiling
PCB: 3 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks
Mercury: Mercury vapour in fluorescent light tubes

Samples:

No samples collected

Room: 108 / 109 Canteen





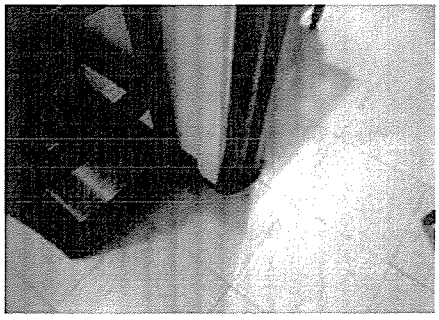
Details:

Ceiling: Drywall Joint Compound
Walls: Concrete Block
Flooring: **Floor Tile Type 1 (12x12 cream streaked) contains asbestos**

HazMat present:

Asbestos: Floor tiles contain asbestos, insulated piping may be concealed in drywall ceiling
PCB: 4 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks
Mercury: Mercury vapour in fluorescent light tubes

Samples:



30 – Baseboard (Black)
no asbestos detected

Comments:
2 Fridges present: R134A

Room: 110 Janitor

Details:

Ceiling: Drywall Joint Compound
Walls: Concrete Block
Flooring: Floor Tile Type 1 (12x12 cream streaked) contains asbestos

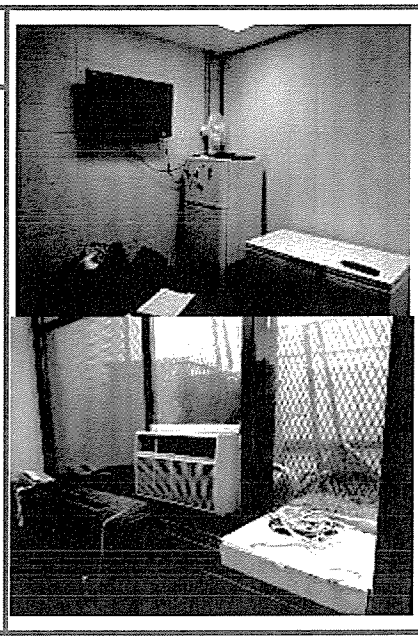
HazMat present:

Asbestos: Floor tiles contain asbestos, insulated piping may be concealed in drywall ceiling
PCB: 0 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples:

No samples collected

Room: 111 Lunch Room



Ceiling: Drywall Joint Compound

Walls: Concrete Block

Flooring: Carpet on Floor Tiles
Floor Tile Type 1 (12x12 cream streaked) contains asbestos

HazMat present:

Asbestos: **Floor tiles contain asbestos, insulated piping may be concealed in drywall ceiling**

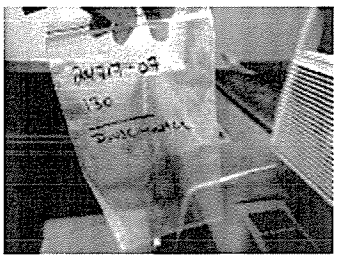
PCB: 2 light fixtures present, ballasts may contain PCBs

Lead: Assume present in paint/surface coatings

Silica: assume present in drywall joint compound and concrete blocks

ODS: Air condition R-22
Fridge R134A

Samples:



7 Drywall Joint Compound
no asbestos detected

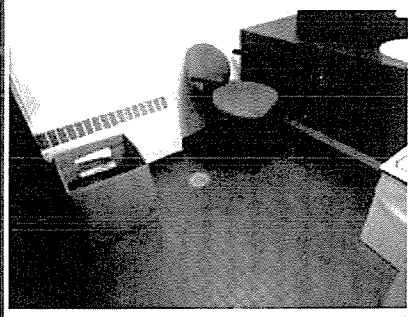
Room: 112 Lavatory

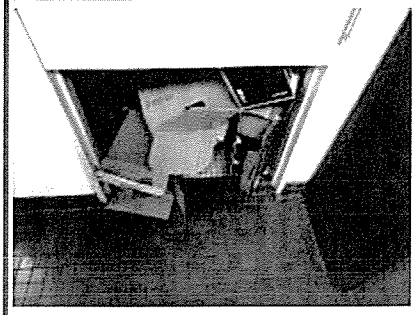
Details:

Ceiling: Drywall Joint Compound
Walls: Drywall Joint Compound, Concrete Block
Flooring: Ceramic Tile

HazMat present:
Asbestos: Insulated piping may be concealed in drywall ceiling
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected





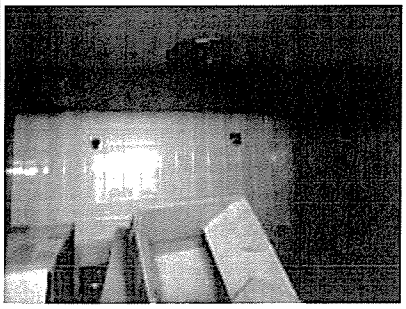
Room: 113 Shower

Details:

Ceiling: Drywall Joint Compound
Walls: Drywall Joint Compound, Concrete Block
Flooring: Ceramic Tile

HazMat present:
Asbestos: Insulated piping may be concealed in drywall ceiling
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected

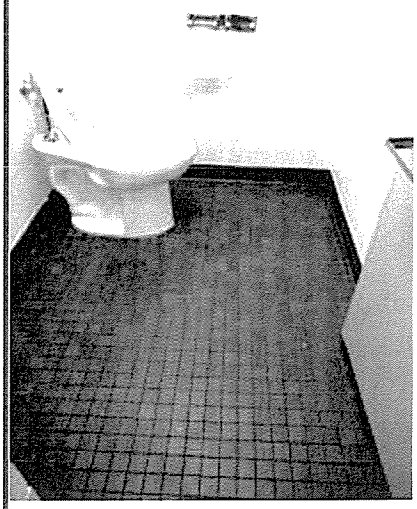


Room: 114 Urinalysis

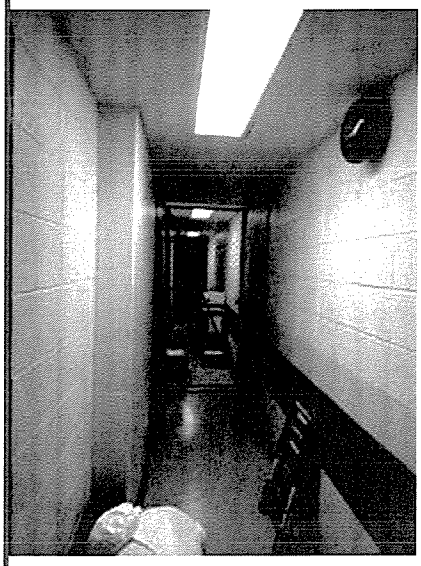
Details:

Ceiling: Drywall Joint Compound
Walls: Concrete Block
Flooring: Ceramic Tile
HazMat present:
Asbestos: Insulated piping may be concealed in drywall ceiling
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: **None Collected**



Room: 115 Hall



Details:

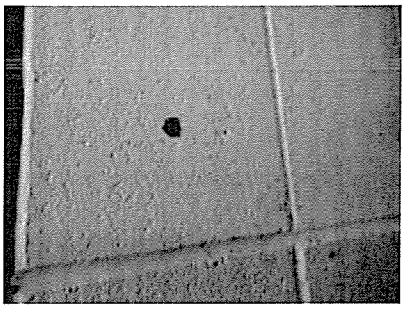
Ceiling: Drywall Joint Compound
Walls: Concrete Block, Concrete Block.
Flooring: **Floor Tile Type 1 (12x12 cream streaked) contains asbestos**

HazMat present:

Asbestos: **Floor tiles contain asbestos , Insulated piping may be concealed in drywall ceiling**
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

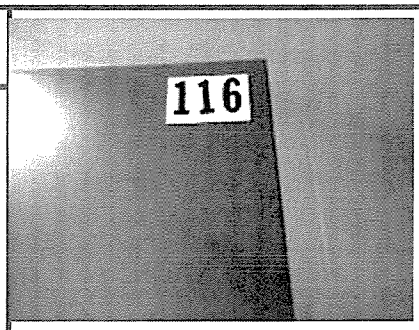
Samples:

19 - Baseboard Adhesive
no asbestos detected



Comments: Drilled Concrete block no vermiculite observed

Room: 116 Storage Inmate Effects



Details:

Ceiling: Concrete
Walls: Concrete, Concrete Block
Flooring: Floor Tile Type 2 – Gray 12"x12"

HazMat present:
Asbestos: Piping and fittings may contain asbestos
PCB: 6 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples:

24717-28 - Floor Tile2
No asbestos detected

Comments: 140 Lineal feet pipe 12 elbows/fittings

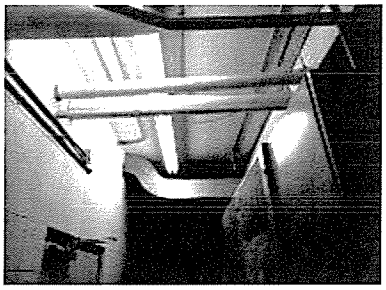
Room: 118 Vault

Details:

Samples:

No access

Room: 119 Electrical Equipment



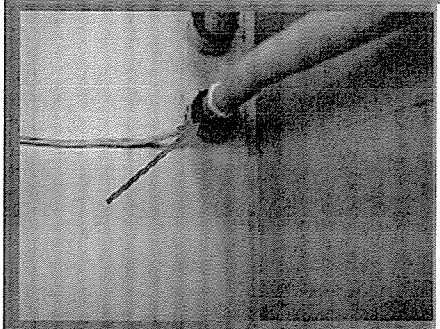
Details:

Ceiling: Concrete
Walls: Concrete, Concrete Block
Flooring: Concrete

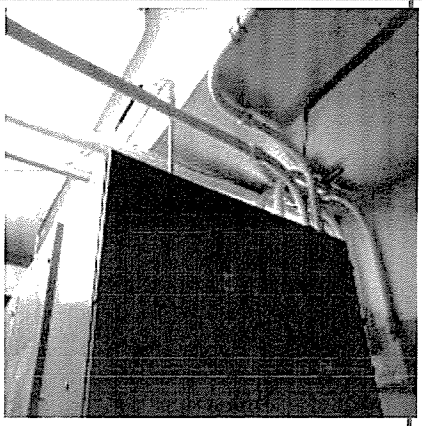
HazMat present:

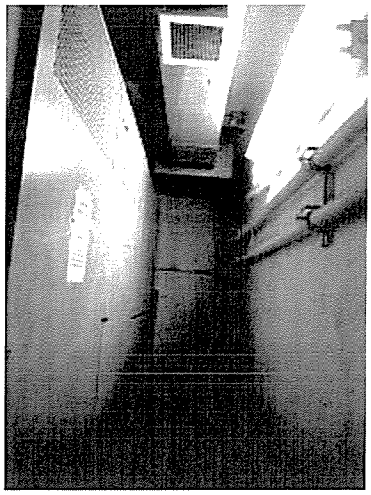
Asbestos: **Black Firestop penetration caulking contains asbestos, piping and fittings may contain asbestos**
PCB: 6 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples:



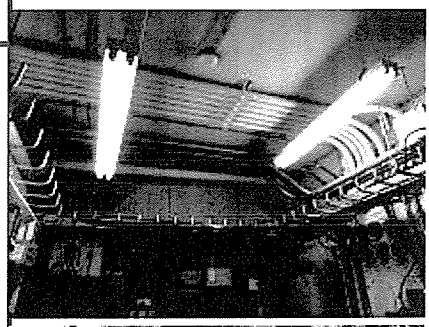
24717-15 - black caulking contains 20% asbestos

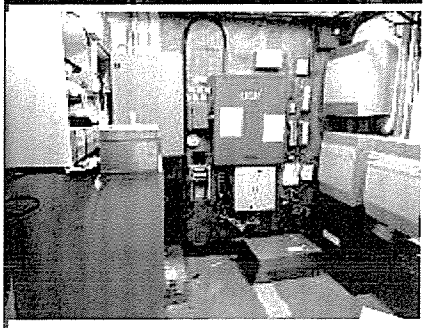




Comments: 12 elbows and 30 Lineal feet of pipe

Room: 120 Telephone Equipment



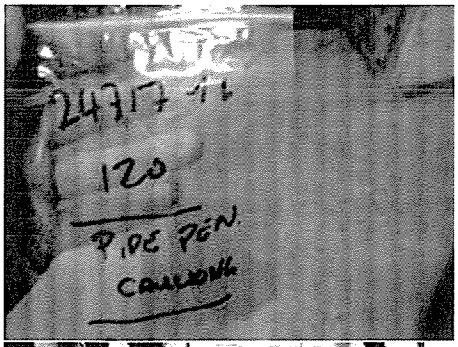


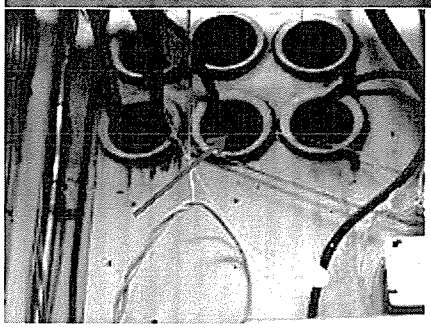
Details:

Ceiling: Concrete
Walls: Concrete, Wood, Concrete Block
Flooring: Concrete

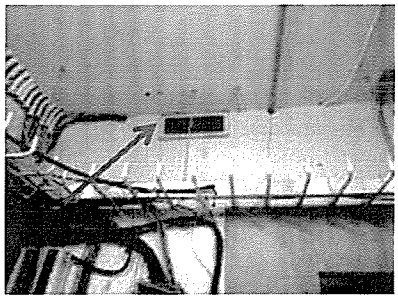
Asbestos: Gray penetration caulking and Red Firestop contains asbestos, piping and fittings may contain asbestos
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

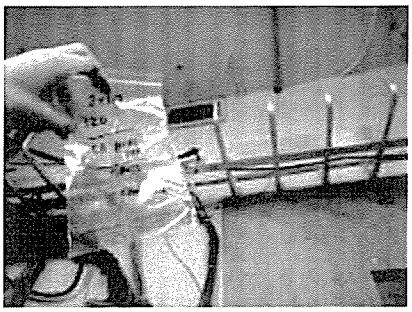
Samples:





24717-16– Red Firestop caulking
Contains 3% Chrysotile

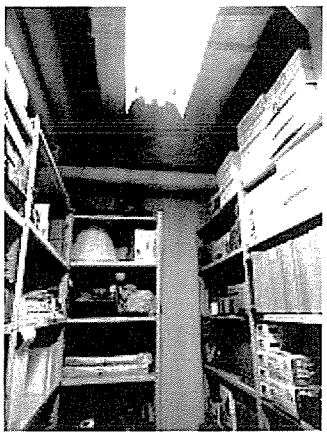




24717-17 and 18– HVAC Caulk grey Boiler exhaust
Contains 5% Chrysotile

Comments: Concrete Block drilled, no vermiculite observed
20 Lineal feet pipe and 3 elbows

Room: 121 Storage

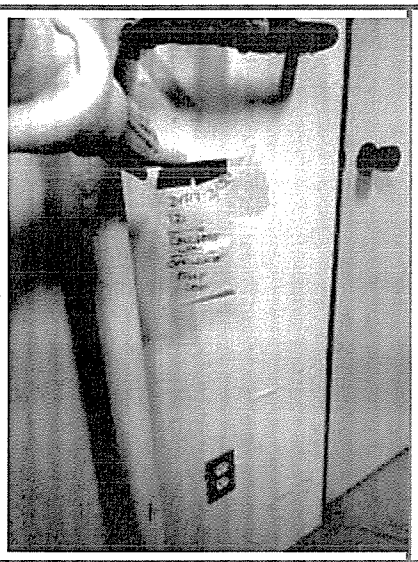


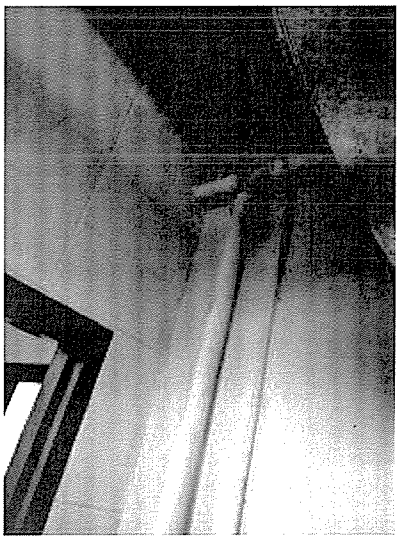
Details:

Ceiling: Concrete
Walls: Concrete, Concrete Block
Flooring: Concrete

Asbestos: Red Firestop contains asbestos, piping and fittings may contain asbestos
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples:





24717-31 paint sample
Concrete block

Comments: 50 Lineal feet pipe and 4 elbows

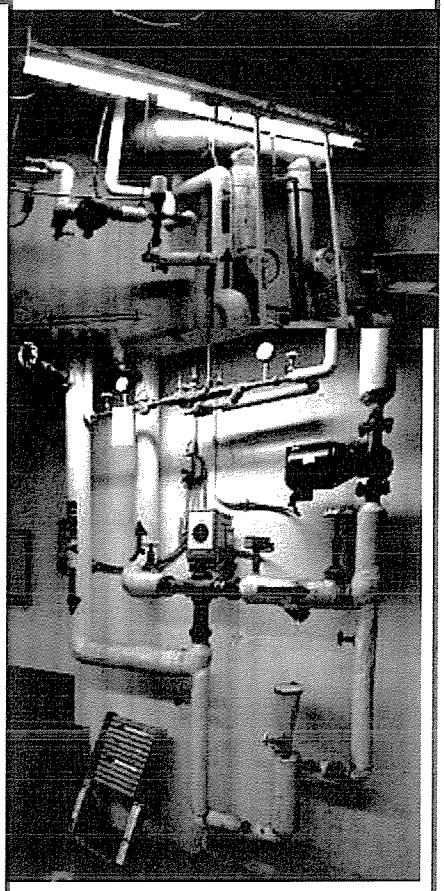
Room: 122 Boiler Room

Details:

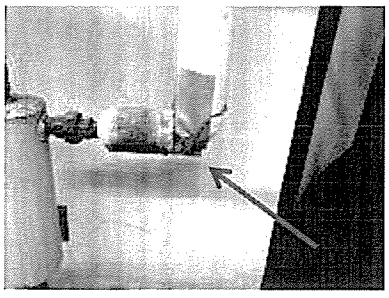
Ceiling: Concrete
Walls: Concrete Block,
Flooring: Concrete

HazMat present:
Asbestos: insulated piping, elbows and gaskets, electrical penetration caulking, pipe penetration, heat shield

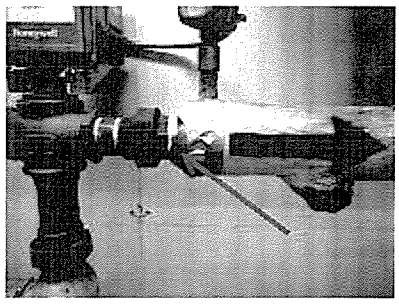
PCB: 4 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in concrete and concrete blocks
Mercury: Mercury vapour in fluorescent light tubes



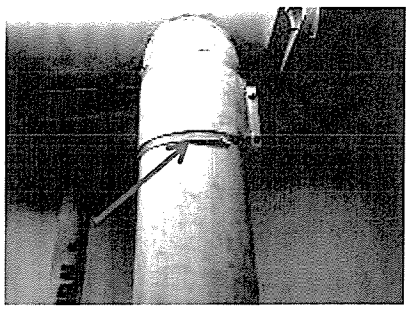
Samples:



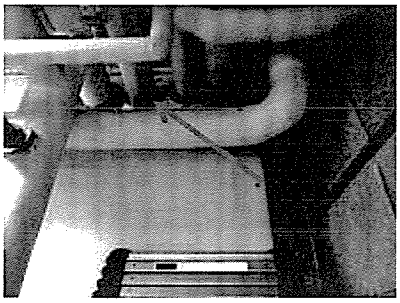
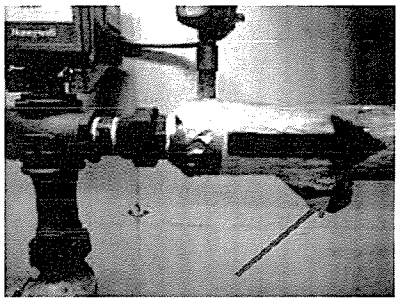
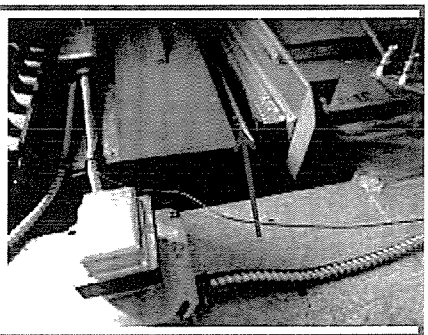
24717-9 Pipe Fitting Insulation; no asbestos detected



24717-10 Pipe Run Insulation (yellow wrap)

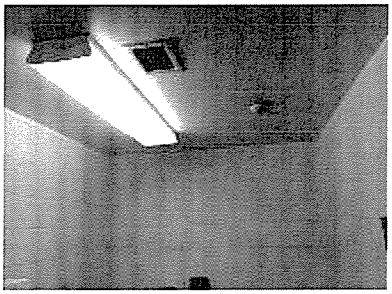


24717-11 – heat shield on Boiler exhaust Contains 40% Chrysotile

		
24717-12 – Red Firestop caulking no asbestos detected	**24717-13 – Gasket on boiler return water line vibration dampener; Contains 40% Chrysotile**	**24717-14 Vibration Dampener; no asbestos detected**

Comments:
Pipe Runs; 42 elbows and fitting 140 lineal ft pipes

Room: 123 Barrier Free Washroom



Details:

Ceiling: Drywall Joint Compound
Walls: Concrete Block
Flooring: Ceramic Tile

HazMat present:
Asbestos: Insulated piping may be concealed in drywall ceiling
PCB: 1 light fixture present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in concrete and concrete blocks
Mercury: Mercury vapour in fluorescent light tubes

Samples: None Collected

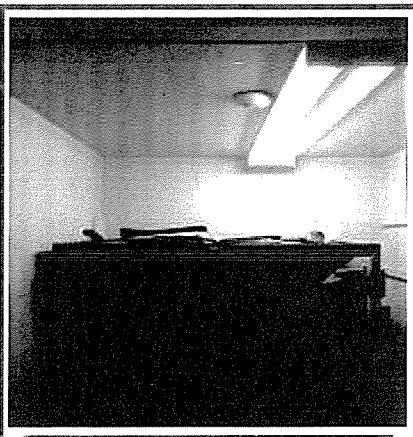
Room: 127 Storage

Details:

Ceiling: Drywall Joint Compound
Walls: Drywall Joint Compound
Flooring: Ceramic Tile

HazMat present:
Asbestos: Insulated piping may be concealed in drywall ceiling
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in concrete and concrete blocks
Mercury: Mercury vapour in fluorescent light tubes

Samples: None Collected



Room: 128 Change Room

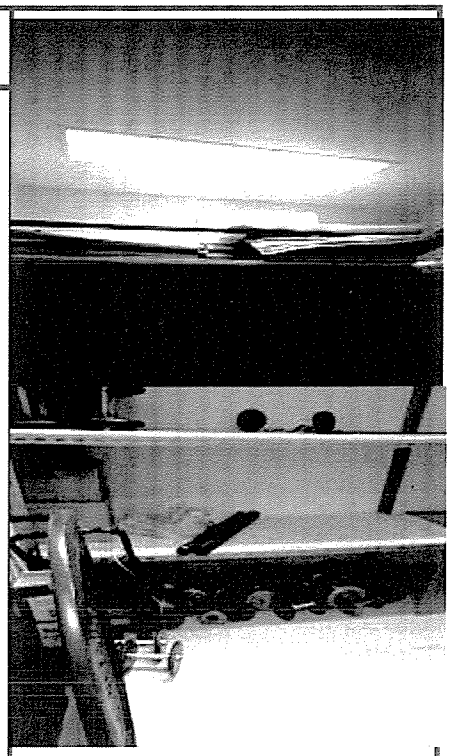
Details:

Ceiling: Drywall Joint Compound
Walls: Drywall Joint Compound, Concrete Block
Flooring: **Floor Tile Type 1 (12x12 cream streaked) contains asbestos**

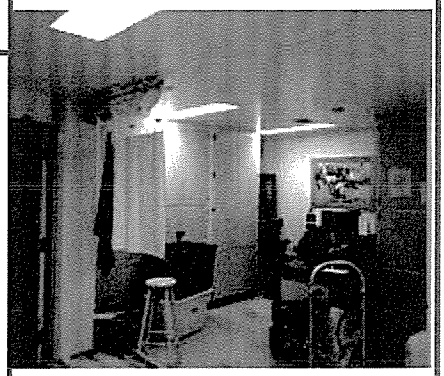
HazMat present:

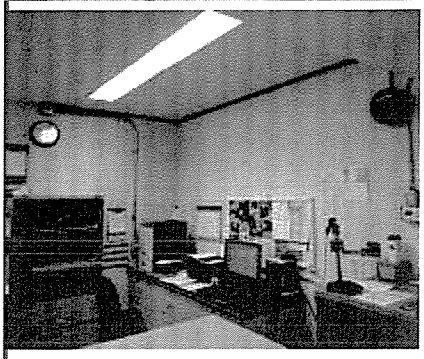
Asbestos: **Floor tiles contain asbestos, insulated piping may be concealed in drywall ceiling**
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in concrete and concrete blocks
Mercury: Mercury vapour in fluorescent light tubes

Samples: None Collected



Room: 129 (105 and 125) Admin and Discharge and Storage





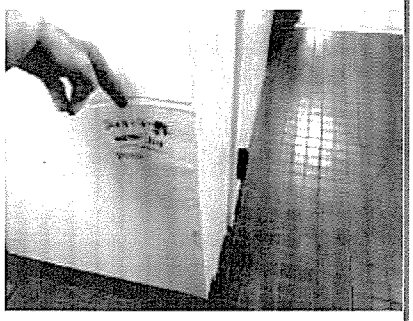
Details:

Ceiling: Drywall Joint Compound
Walls: Drywall Joint Compound , Concrete Block
Flooring: **Floor Tile Type 1 (12x12 cream streaked) contains asbestos**

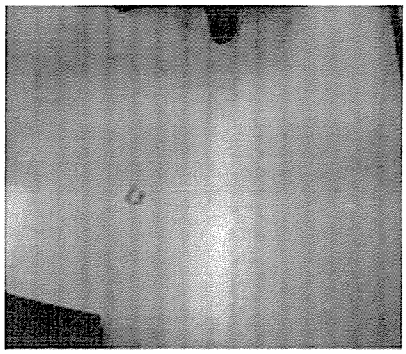
HazMat present:

Asbestos: **Floor tiles contain asbestos, insulated piping may be concealed in drywall ceiling**
PCB: 8 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in concrete and concrete blocks
Mercury: Mercury vapour in fluorescent light tubes

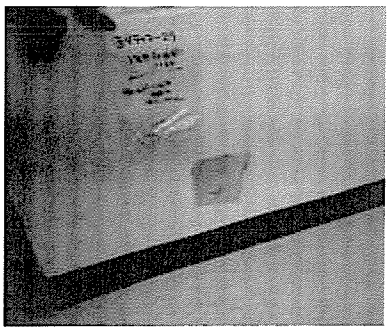
Samples:



24717-26 - Drywall Joint Compound; no asbestos detected

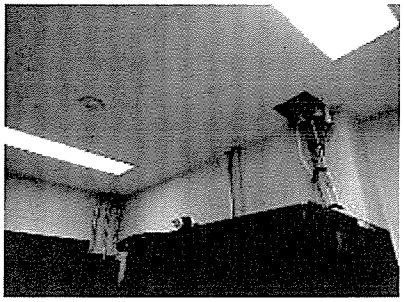


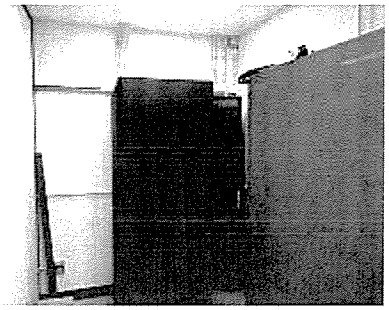
Floor tiles contain asbestos



24717-29 Paint – Wall contains <0.01 mg/kg Lead

Room: 130 I/T room off of lunch room 111





Details:

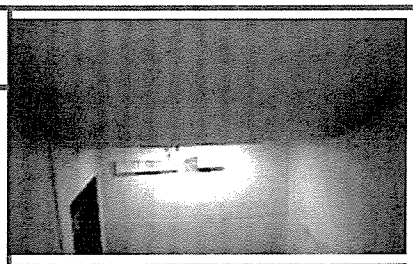
Ceiling: Drywall Joint Compound
Walls: Concrete, Concrete Block
Flooring: **Floor Tile Type 1 (12x12 cream streaked) contains asbestos**

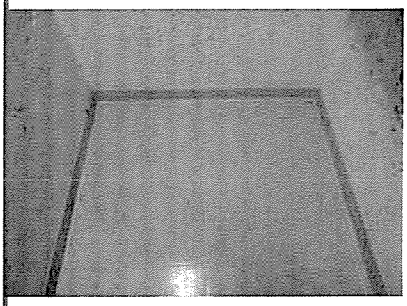
HazMat present:

Asbestos: **Floor tiles contain asbestos, insulated piping may be concealed in drywall ceiling**
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in concrete and concrete blocks
Mercury: Mercury vapour in fluorescent light tubes

Samples: None Collected

Room: Stairway to Second Floor





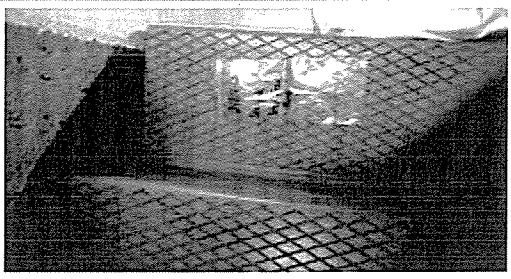
Details:

Ceiling: Concrete
Walls: Concrete, Concrete Block
Flooring: Floor Tile Type 2 – Gray 12"x12"

HazMat present:
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples:

24717-32 - Drywall Joint Compound; no asbestos detected



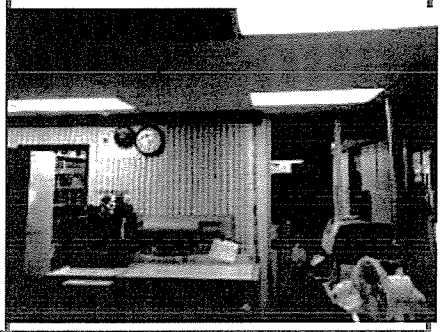
Room: 200 General Office

Details:

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole

Walls: Prefinished Wall panels

Flooring: Gray speckled flooring and carpet



HazMat present:

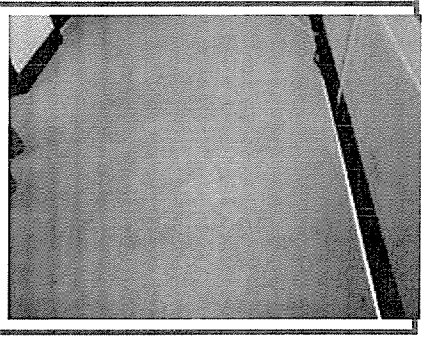
PCB: 22 light fixtures present, ballasts may contain PCBs

Lead: Assume present in paint/surface coatings

Silica: assume present in drywall joint compound and concrete blocks

Samples:

24717-21 Gray flooring
no asbestos detected



Room: 201 Warden

Details:

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole

Walls: Prefinished Wall panels

Flooring: Carpet on concrete

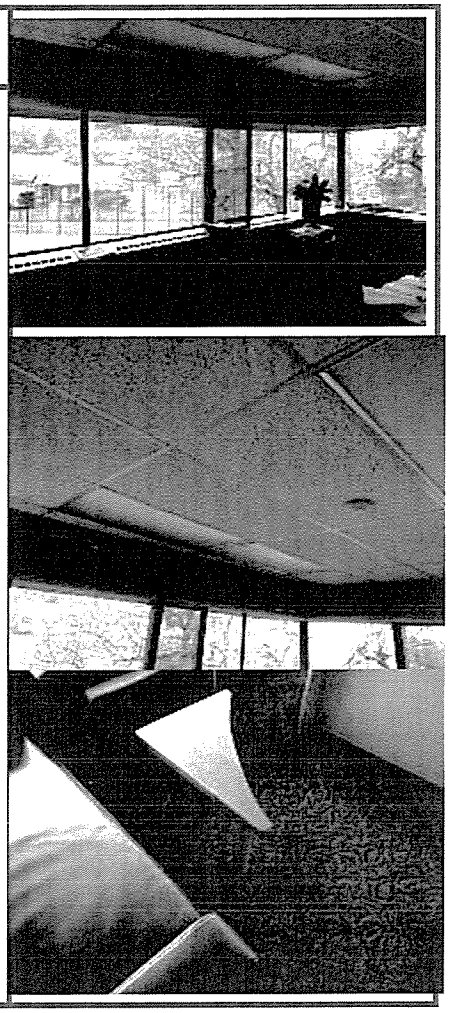
HazMat present:

PCB: 8 light fixtures present, ballasts may contain PCBs

Lead: Assume present in paint/surface coatings

Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected

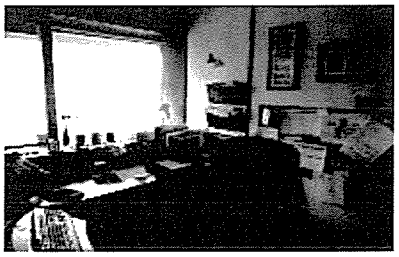


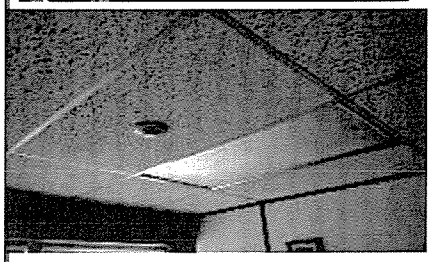
Room: 202 IPSO office

Details:

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole
Walls: Prefinished Wall panels
Flooring: Carpet on concrete
HazMat present:
PCB: 4 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected



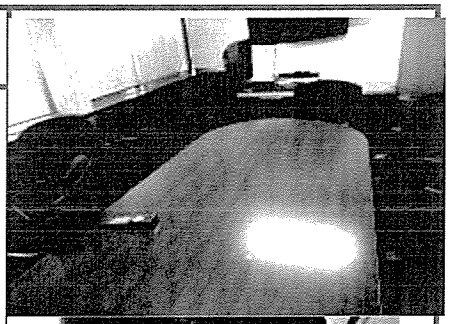


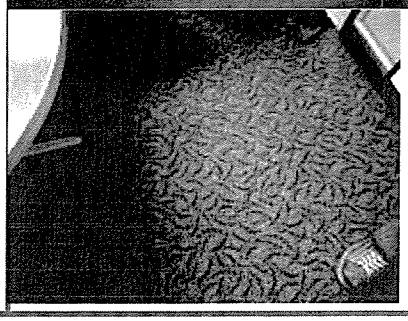
Room: 203 Boardroom

Details:

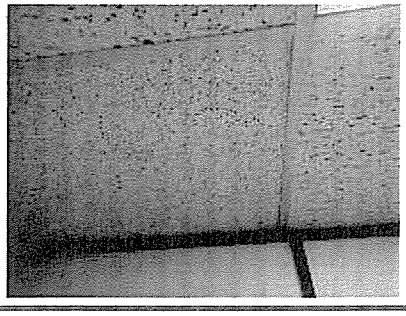
Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole and Type 2- Patterned Fissure and Pinhole
Walls: Prefinished Wall panels
Flooring: Carpet on concrete
HazMat present:
PCB: 4 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples:





24717-24 Acoustic Ceiling Tile 2
No asbestos detected

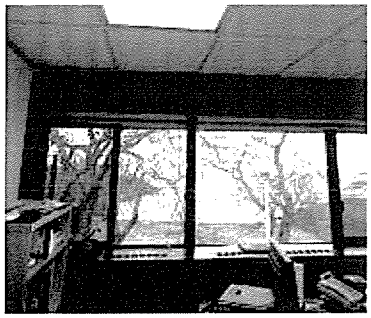


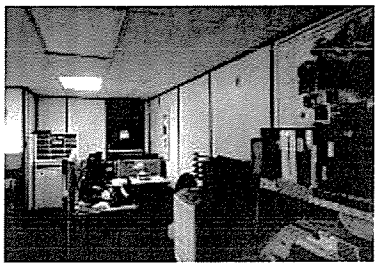
Room: 204 AW Mgmt Services

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole
Walls: Prefinished Wall panels
Flooring: Carpet on concrete

HazMat present:
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected



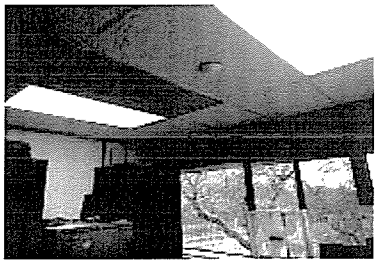


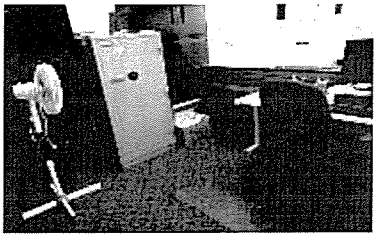
Room: 205 Finance Computer Room

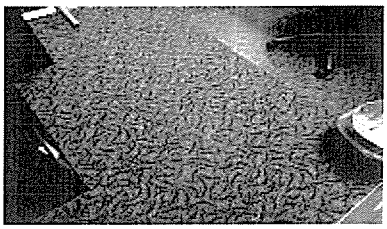
Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole
Walls: Prefinished Wall panels
Flooring: Carpet on concrete

HazMat present:
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected







Room: 206 Chief Finance

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole

Walls: Prefinished Wall panels

Flooring: Carpet on concrete

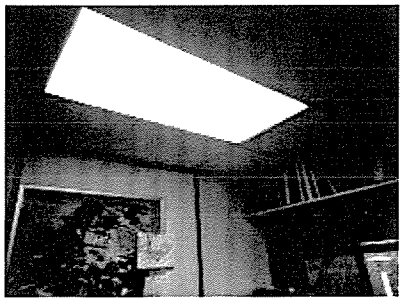
HazMat present:

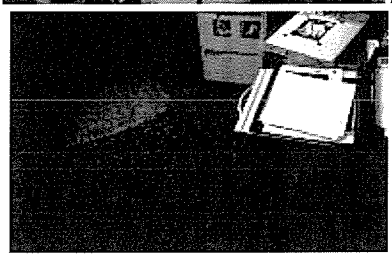
PCB: 2 light fixtures present, ballasts may contain PCBs

Lead: Assume present in paint/surface coatings

Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected





Room: 207 Administration Office

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole

Walls: Prefinished Wall panels

Flooring: Carpet on concrete

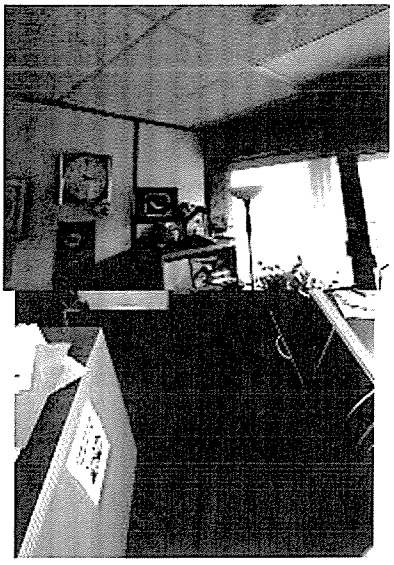
HazMat present:

PCB: 2 light fixtures present, ballasts may contain PCBs

Lead: Assume present in paint/surface coatings

Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected



Room: 208 Deputy Warden

Details:

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole

Walls: Prefinished Wall panels

Flooring: Carpet on concrete

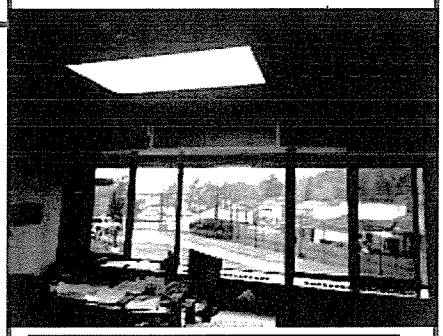
HazMat present:

PCB: 2 light fixtures present, ballasts may contain PCBs

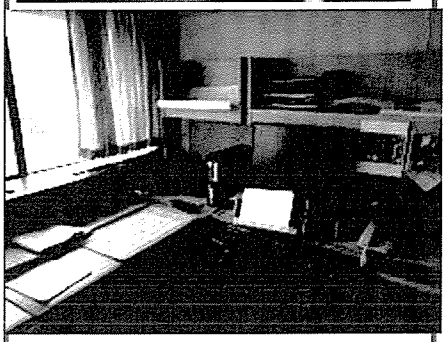
Lead: Assume present in paint/surface coatings

Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected



Room: 209 Assistant to Deputy Warden



Details:

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole

Walls: Prefinished Wall panels

Flooring: Carpet on concrete

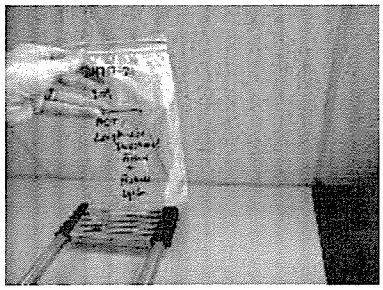
HazMat present:

PCB: 2 light fixtures present, ballasts may contain PCBs

Lead: Assume present in paint/surface coatings

Silica: assume present in drywall joint compound and concrete blocks

Samples:



24717-21 - Acoustic Ceiling Tile Type 1
Lengthwise directions fissure & pinhole;
No asbestos detected

24717-22 - Drywall Joint Compound
No asbestos detected

Room: 211 Resource Room

Details:

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole
Walls: Prefinished Wall panels
Flooring: Carpet on concrete

HazMat present:
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: **None Collected**

Camera Failure

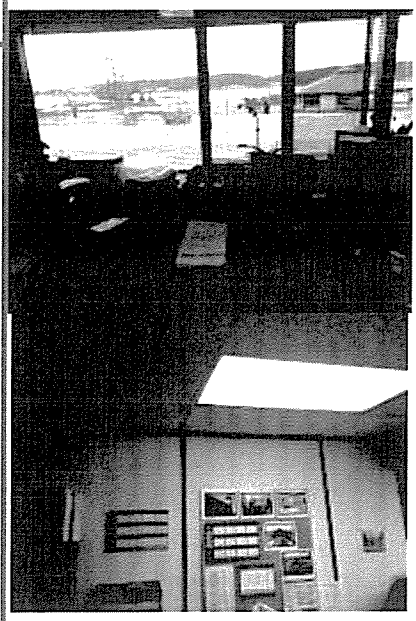
Room: 213 Staff Training Coordinator

Details:

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole
Walls: Prefinished Wall panels
Flooring: Carpet on concrete

HazMat present:
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: **None Collected**



Room: 214 Personnel and Staffing Asst

Details:

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole
Walls: Prefinished Wall panels
Flooring: Carpet on concrete

HazMat present:
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: **None Collected**

Camera failure

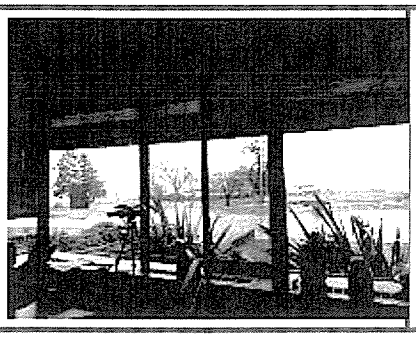
Room: 215 HR Coordinator

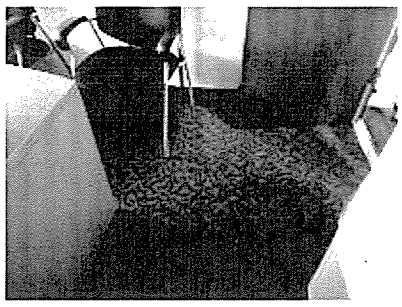
Details:

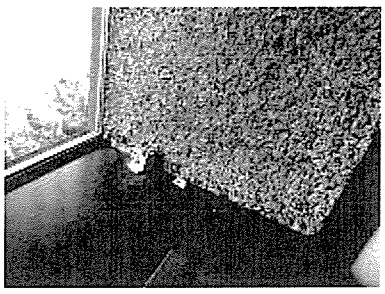
Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole
Walls: Prefinished Wall panels
Flooring: Carpet on concrete

HazMat present:
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

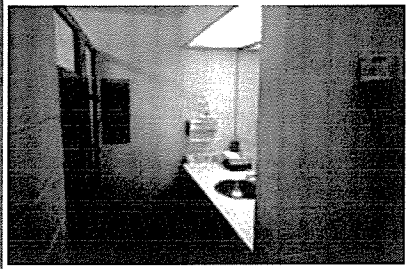
Samples: None Collected







Room: 216 Womans Washroom



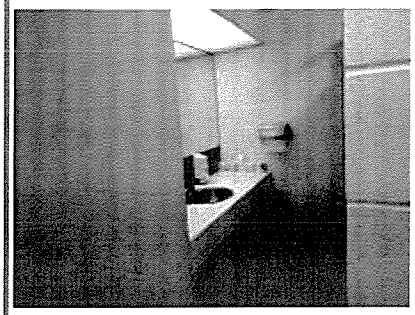
Details:

Ceiling: Drywall Joint Compound
Walls: Concrete Block
Flooring: Ceramic Tile

HazMat present:
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: **None Collected**

Room: 217 Mens Washroom



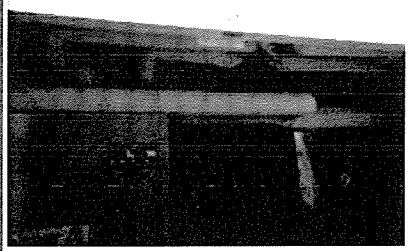
Details:

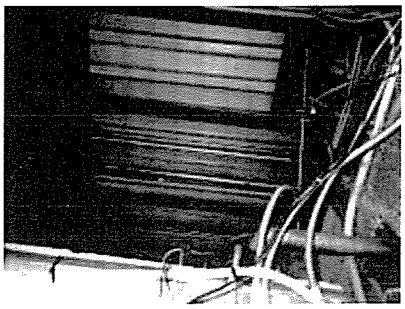
Ceiling: Drywall Joint Compound
Walls: Concrete Block
Flooring: Ceramic Tile

HazMat present:
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected

Room: 218 Mechanical Equipment



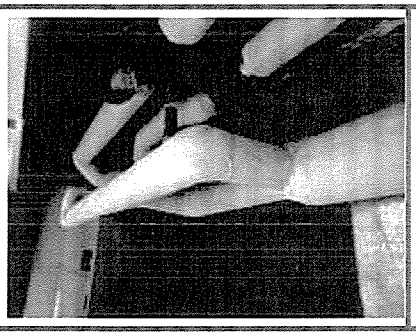


Details:

Ceiling: Q-Deck
Walls: Concrete Block
Flooring: Concrete

HazMat present:
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected



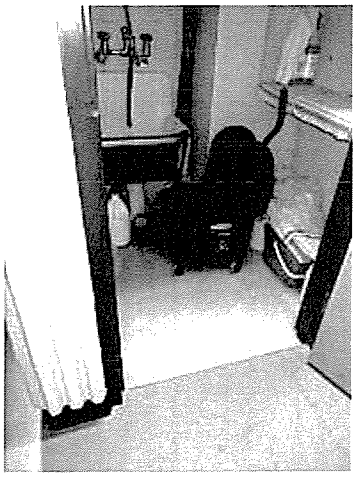
Comments: 20 Lineal Feet Pipe, 16 Elbows

Room: 219 Janitor

Details:

Ceiling: Drywall Joint Compound
Walls: Concrete Block
Floor Tile Type 1 (12x12 cream streaked) contains asbestos

HazMat present:
Asbestos: Floor tiles contain asbestos,
Lead: Assume present in paint/surface coatings
Silica: assume present in concrete and concrete blocks



Samples:

24717-25
Drywall joint compound;
No asbestos detected

Room: 220 Accounts Office

Details:

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole

Walls: Prefinished Wall panels

Flooring: Carpet on concrete

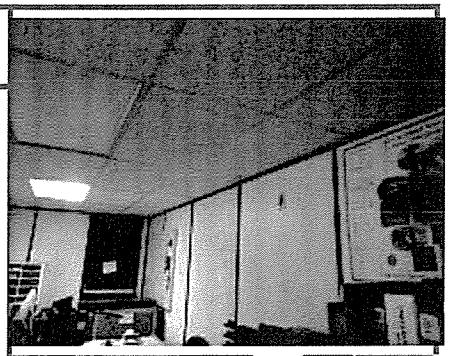
HazMat present:

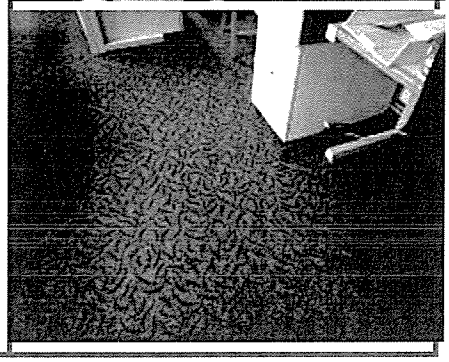
PCB: 8 light fixtures present, ballasts may contain PCBs

Lead: Assume present in paint/surface coatings

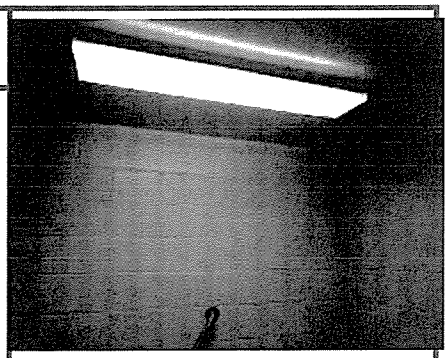
Silica: assume present in drywall joint compound and concrete blocks

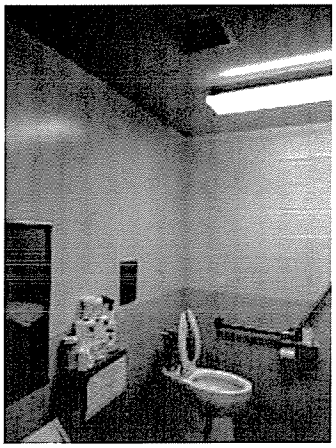
Samples: **None Collected**





Room: 222 Handicap Washroom





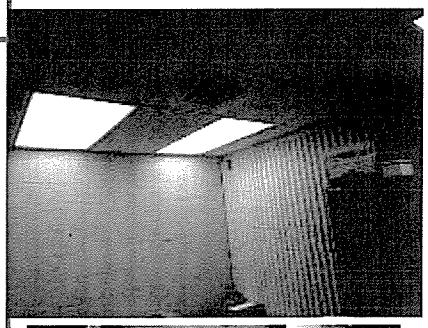
Details:

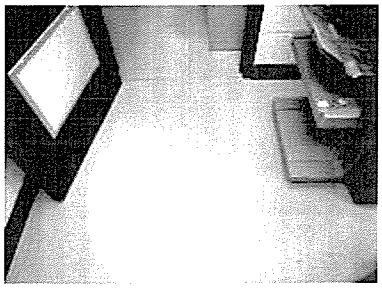
Ceiling: Drywall Joint Compound
Walls: Concrete Block
Flooring: Ceramic Tile

HazMat present:
PCB: 2 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: None Collected

Room: 223 Copy Room





Details:

Ceiling: Acoustic Ceiling Tile type 1 - Lengthwise directions fissure & pinhole
Walls: Prefinished Wall panels
Flooring: Sheet Flooring on concrete

HazMat present:
PCB: 4 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: **24717-23**
Sheet flooring type 2

No asbestos detected

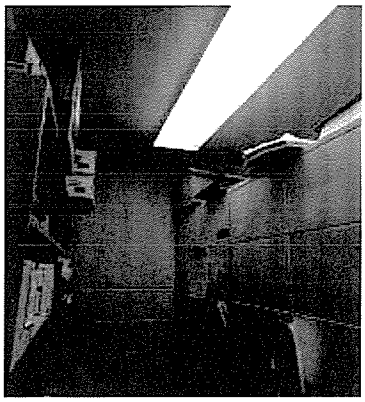
Room: 224 File Vault

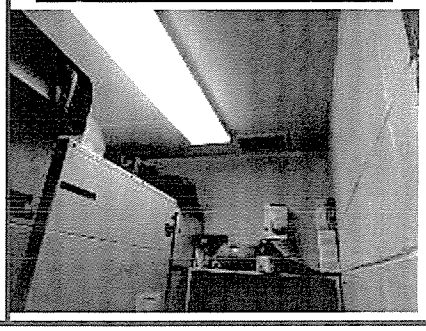
Details:

Ceiling: Concrete
Walls: Concrete, Concrete Block
Flooring: Carpet tiles, Concrete

HazMat present:
PCB: 6 light fixtures present, ballasts may contain PCBs
Lead: Assume present in paint/surface coatings
Silica: assume present in drywall joint compound and concrete blocks

Samples: **None Collected**

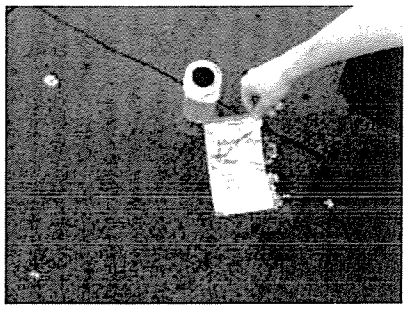




<table>
<tr><td colspan="2">Room: Roof</td></tr>
<tr><td>Details:

Asphalt Flat Roof-limited sampling allowed per client request

Lead vent

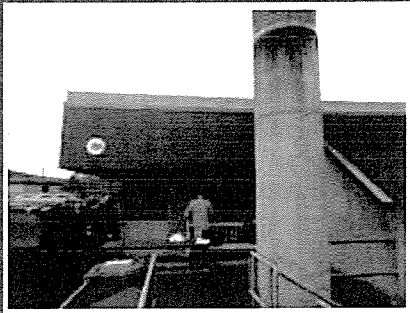
Samples:</td><td>  </td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>24717-37 Red Asphalt
No asbestos detected</td><td>24717-38 Vent Pipe Caulking
No asbestos detected</td></tr>
</table>

Room: Exterior

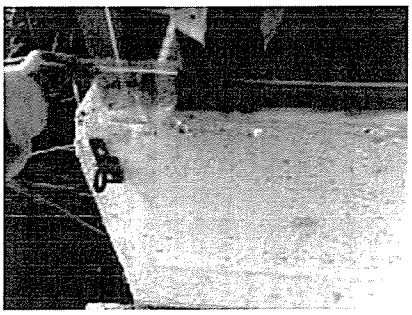
Details:

Concrete, wood exterior, aluminum windows:
Brown caulking

Samples:



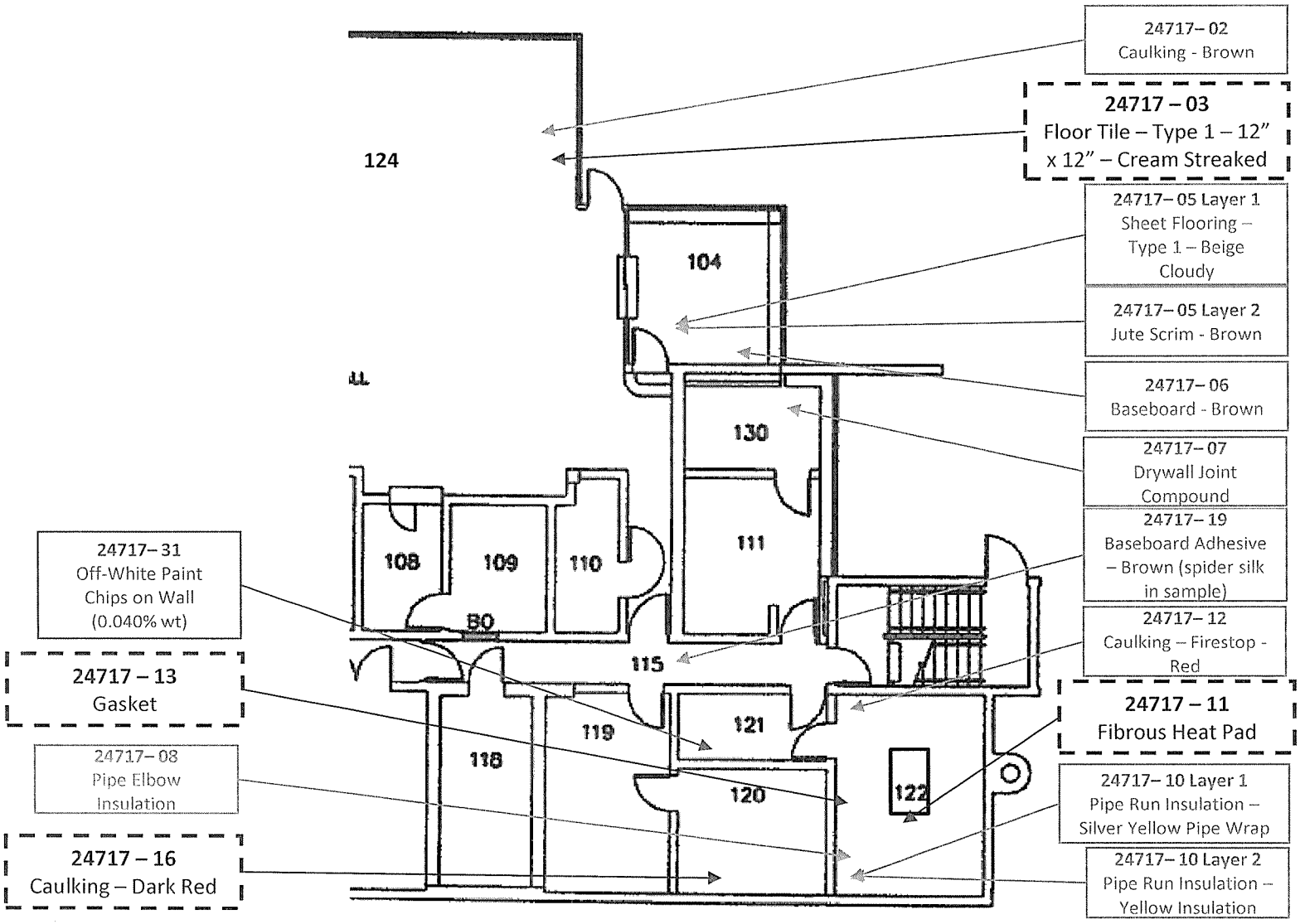
24717-39 Brown Paint <0.10 mg/kg



24717-33, 34 and 35
Brown Caulking
no asbestos detected

7.0 APPENDICES

APPENDIX 1: BULK SAMPLE LOCATIONS AND DRAWINGS



DRAWING NOT TO SCALE

LEGEND **ASBESTOS**

123 No Asbestos Detected

123 Material Contains Asbestos

123 Contains Lead

ADDRESS/LOCATION:
William Head – Admin Building
Main Floor – East End

DRAWING TITLE:
Sample Locations

PROJECT NO.: 24717

DATE: 25/03/2015

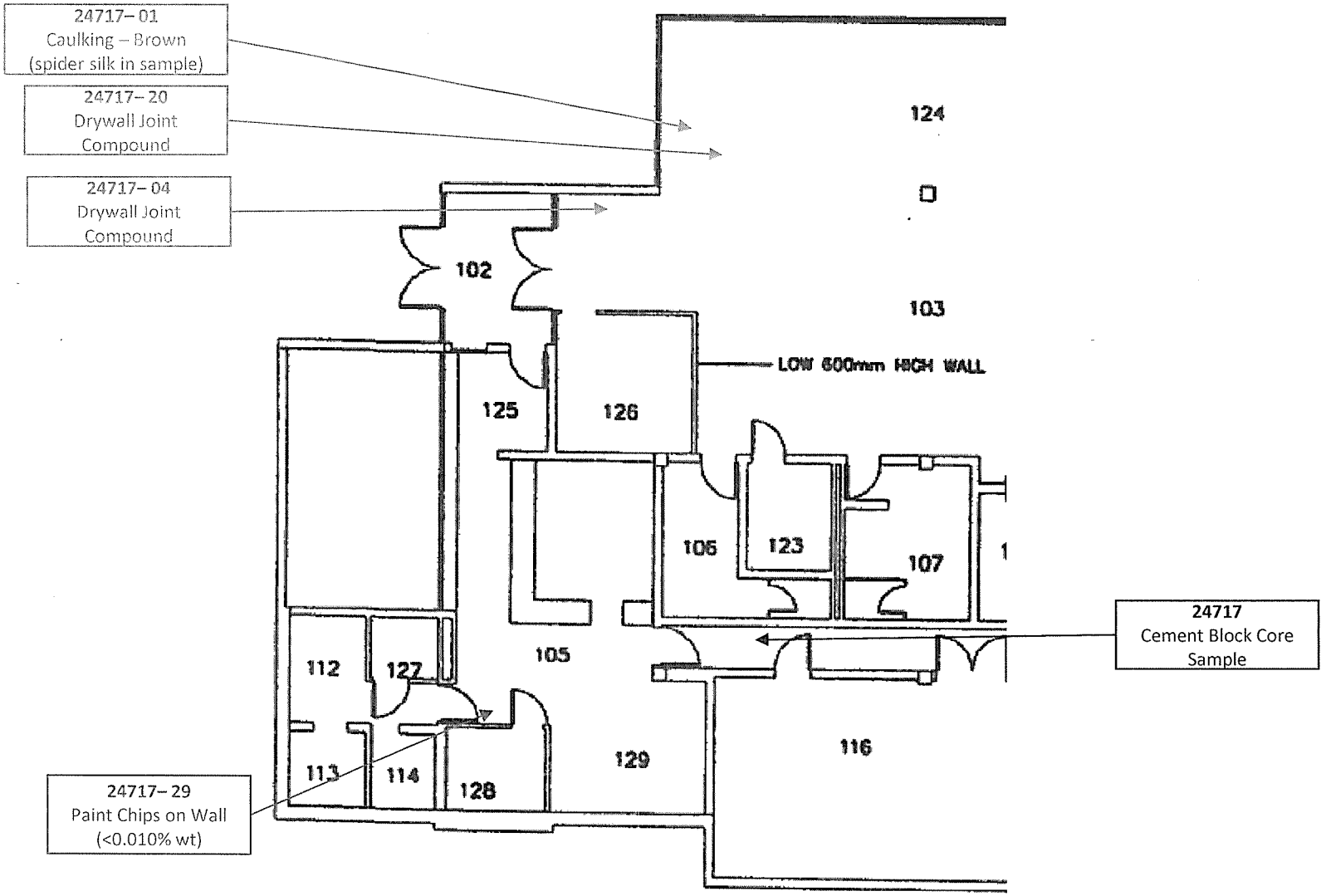
SURVEYED BY: JSM/WR

DRAWING NO.: 001

North West Environmental Group Ltd.

#210 – 2950 Douglas St.

Victoria, BC V8T 4N4



DRAWING NOT TO SCALE

LEGEND **ASBESTOS**

123	No Asbestos Detected
123	Material Contains Asbestos
123	Contains Lead

ADDRESS/LOCATION:
William Head – Admin Building
Main Floor – West End

DRAWING TITLE:
Sample Locations

PROJECT NO.: 24717

DATE: 25/03/2015

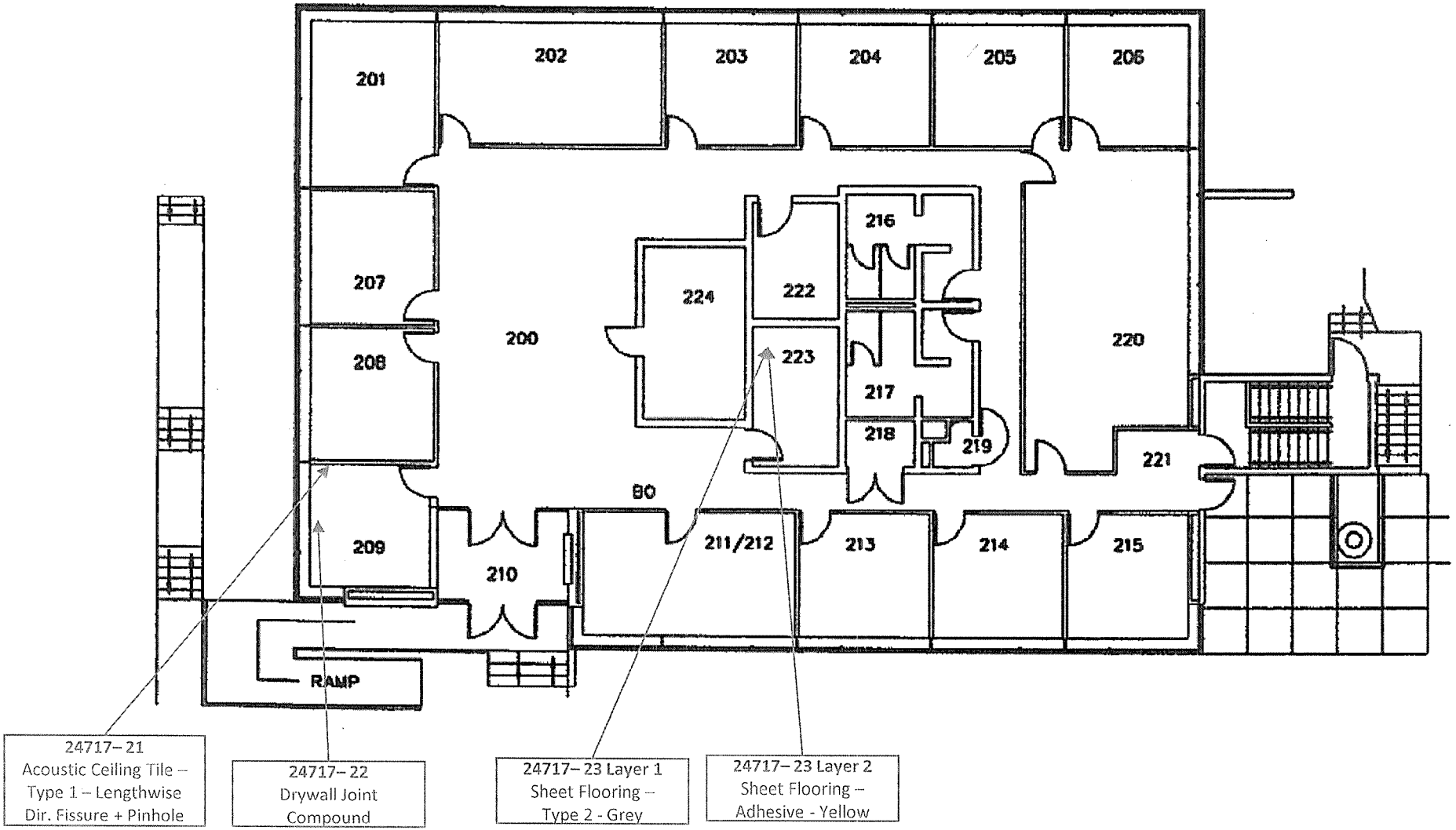
SURVEYED BY: JSM/WR

DRAWING NO.: 002

North West Environmental Group Ltd.

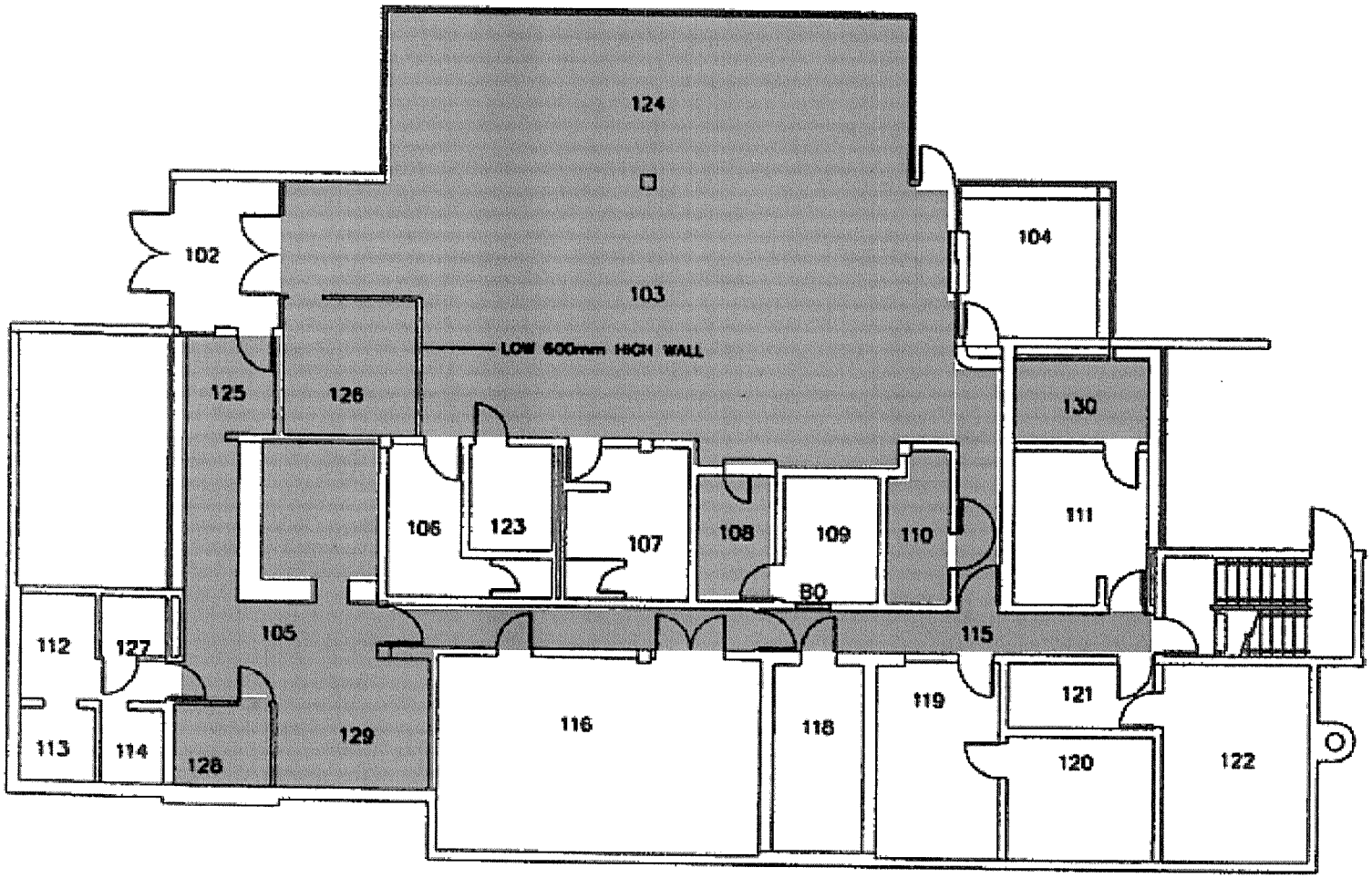
#210 – 2950 Douglas St.

Victoria, BC V8T 4N4



DRAWING NOT TO SCALE

LEGEND	ASBESTOS			
123	No Asbestos Detected	ADDRESS/LOCATION: William Head – Admin Building Upper Level	**PROJECT NO.: 24717**	North West Environmental Group Ltd.
123	Material Contains Asbestos	DRAWING TITLE: Sample Locations	DATE: 25/03/2015	#210 – 2950 Douglas St.
123	Contains Lead		SURVEYED BY: JSM/WR	Victoria, BC V8T 4N4
			DRAWING NO.: 003	



DRAWING NOT TO SCALE

LEGEND **ASBESTOS**

Asbestos containing floor tile is present.

ADDRESS/LOCATION:
William Head – Admin Building
Lower Level

DRAWING TITLE:
Locations of asbestos containing floor tile

PROJECT NO.: 24717

DATE: 25/03/2015

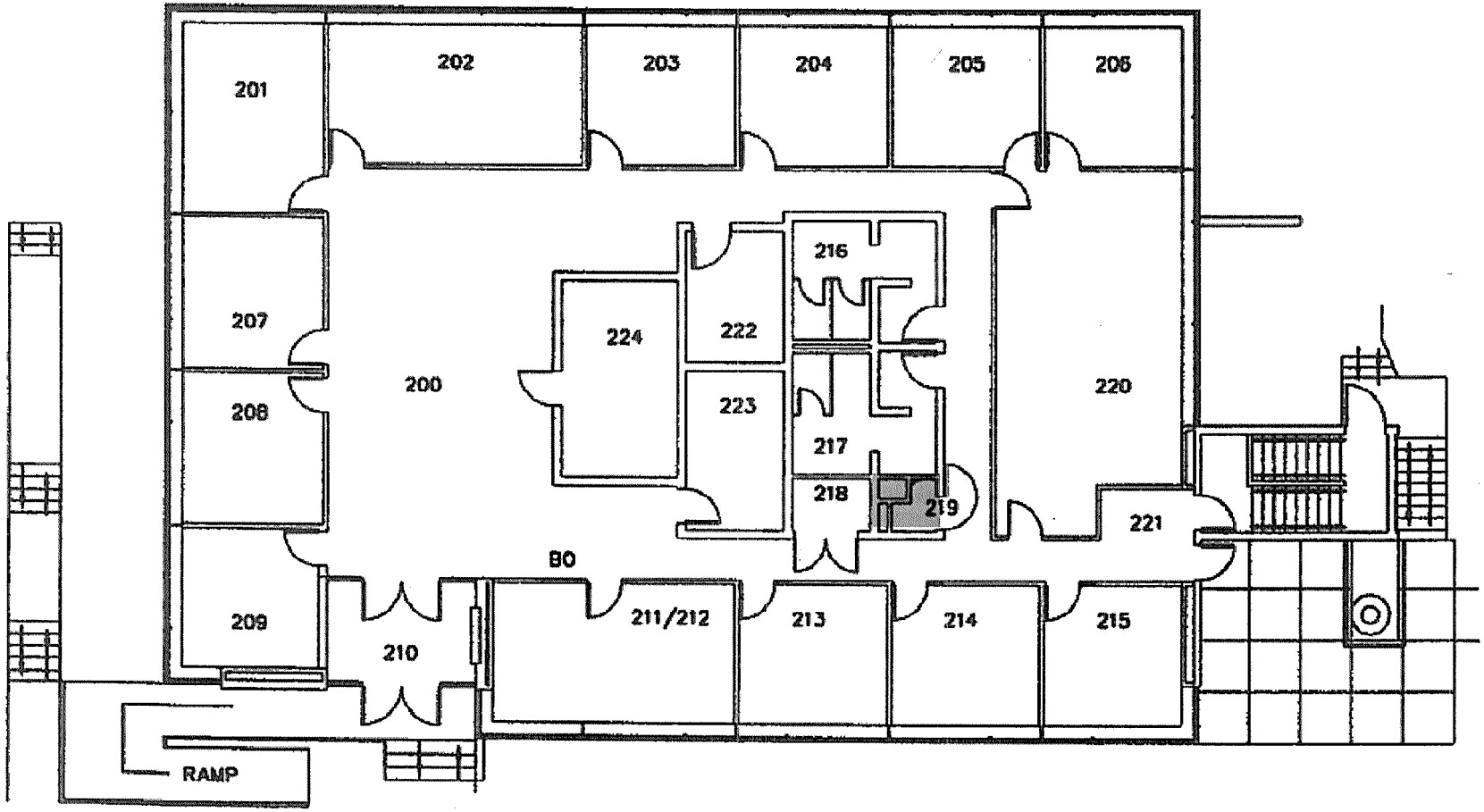
SURVEYED BY: JSM/WR

DRAWING NO.: 004

North West Environmental Group Ltd.

#210 – 2950 Douglas St.

Victoria, BC V8T 4N4



DRAWING NOT TO SCALE

LEGEND **ASBESTOS**

Asbestos containing floor tile is present.

ADDRESS/LOCATION:
William Head – Admin Building
Upper Level

DRAWING TITLE:
Locations of asbestos containing floor tile

PROJECT NO.: 24717

DATE: 25/03/2015

SURVEYED BY: JSM/WR

DRAWING NO.: 005

North West Environmental Group Ltd.

#210 – 2950 Douglas St.

Victoria, BC V8T 4N4

APPENDIX 2: BULK SAMPLE RESULTS

North West
Environmental Group Ltd.

Unit 210 - 2950 Douglas Street
Victoria, B.C. V8T 4N4

Tel: 250-384-9695
Fax: 250-384-9865
e-mail: northwest@nwest.bc.ca

Bulk Sample Report

Asbestos Analysis of Bulk Materials using Polarized Light Microscopy

Client: Public Works and Government Services Canada
Contractor: Public Works and Government Services Canada
Project: William Head - Admin Building HazMat

Date: March 25, 2015
Client Job or PO#: 700320709
Project number: 24717

Sample No	Location	Date Analysed	Analyst	Description	Phase	%	Asbestos	%	Other Materials	%
24717-1	124/103 - Sun-Window	Mar-24-2015	LR	Caulking - Brown (spider silk in sample)	Brown	100	None Detected	0	Non-Fibrous	100
24717-2	124/103 - Sun-Window	Mar-24-2015	LR	Caulking - Brown	Brown	100	None Detected	0	Non-Fibrous	100
24717-3	124/103	Mar-24-2015	LR	Floor Tile - Type 1 - 12"x12" Cream Streaked	Cream	100	Chrysotile	3	Non-Fibrous	97
24717-4	124/103 - Ceiling	Mar-23-2015	LR	Drywall Joint Compound	Off White	100	None Detected	0	Non-Fibrous	100
24717-5 Layer 1	104	Mar-23-2015	LR	Sheet Flooring - Type 1 - Beige Cloudy	Wear Surface-Beige	50	None Detected	0	Non-Fibrous	100
24717-5 Layer 2	104	Mar-23-2015	LR	Sheet Flooring - Type 1 - Beige Cloudy	Jute Scrim-Brown	50	None Detected	0	Non-Fibrous (1%) Cellulose (99%)	100
24717-6	104	Mar-24-2015	LR	Baseboard (Brown)	Brown	100	None Detected	0	Non-Fibrous	100
24717-7	130 - Wall	Mar-23-2015	LR	Drywall Joint Compound	Peach/White	100	None Detected	0	Non-Fibrous	100
24717-8	122	Mar-23-2015	LR	Pipe Elbow Insulation	Pipe Insulation-Off White/Tan	100	None Detected	0	Non-Fibrous (85%) Glass (15%)	100
24717-9	122	Mar-23-2015	LR	Pipe Fittings Insulation	Pipe Elbow-Off White/Beige	100	None Detected	0	Glass (15%) Non-Fibrous (85%)	100
24717-10 Layer 1	122	Mar-23-2015	LR	Pipe Run Insulation	Pipe Wrap-Silver/Yellow	20	None Detected	0	Non-Fibrous (30%) Non-Fibrous (60%) Glass (10%)	100
24717-10 Layer 2	122	Mar-23-2015	LR	Pipe Run Insulation	Insulation-Yellow	80	None Detected	0	Glass	100
24717-11	122 - Boiler Trunk - Below Metal Strapping	Mar-23-2015	LR	Fibrous Heat Pad	Heat Pad-Black/Red	100	Chrysotile	40	Non-Fibrous	60
24717-12	122 - Pipe Penetration	Mar-24-2015	LR	Caulking - Firestop - Red	Red	100	None Detected	0	Non-Fibrous (95%) Glass (5%)	100

Note: Samples were analyzed by method: EPA/600/R-93/116" Bulk Asbestos Analysis by Polarized Light Microscopy". For heterogenous materials the concentration may vary. No reproduction without permission.

AIHA Proficiency Analytical Testing Programs, LLC

Sample No	Location	Date Analysed	Analyst	Description	Phase	%	Asbestos	%	Other Materials	%
24717-13	122 - Boiler Return	Mar-23-2015	LR	Gasket	Gasket-Black	100	Chrysotile	40	Non-Fibrous	60
24717-14	122 - HVAC	Mar-23-2015	LR	Vibration Dampener (Black)	Black	100	None Detected	0	Non-Fibrous (70%) Glass (30%)	100
24717-15	119 - Electrical Penetration	Mar-23-2015	LR	Firestop (Black)	Black	100	Chrysotile	20	Non-Fibrous	80
24717-16	120 - Pipe Penetration	Mar-24-2015	LR	Caulking - Dark Red	Dark Red	100	Chrysotile	3	Non-Fibrous	97
24717-17	120 - Block HVAC Penetration	Mar-24-2015	LR	Caulking - Grey	Grey	100	Chrysotile	5	Non-Fibrous	95
24717-18	120 - Around HVAC Penetration	Mar-25-2015	LR	Caulking - Grey	Grey	100	Chrysotile	5	Non-Fibrous	95
24717-19	Hallway 115	Mar-23-2015	LR	Baseboard Adhesive (Brown) - spider silk in sample	Brown	100	None Detected	0	Non-Fibrous	100
24717-20	124/103 - Ceiling	Mar-23-2015	LR	Drywall Joint Compound	White	100	None Detected	0	Non-Fibrous	100
24717-21	209	Mar-23-2015	LR	Ceiling Tile - Acoustic 1 - Lengthwise Dir. Fissure +Pinhole	White/Tan	100	None Detected	0	Cellulose (25%) Glass (25%) Non-Fibrous (50%)	100
24717-22	209	Mar-23-2015	LR	Drywall Joint Compound	Cream/White	100	None Detected	0	Non-Fibrous	100
24717-23 Layer 1	209 - Outside in Hall	Mar-23-2015	LR	Sheet Flooring - Type 2 - Grey	Grey	99	None Detected	0	Non-Fibrous	100
24717-23 Layer 2	209 - Outside in Hall	Mar-23-2015	LR	Sheet Flooring - Type 2 - Grey	Adhesive-Yellow	1	None Detected	0	Non-Fibrous	100
24717-24	203			Ceiling Tile - Acoustic 2 - Patterned Fissure + Pinhole	White/Tan	100	None Detected	0	Cellulose (30%) Glass (2%) Non-Fibrous (68%)	100
24717-25	219			Drywall Joint Compound	Cream/White	100	None Detected	0	Non-Fibrous	100
24717-26	125			Drywall Joint Compound	White	100	None Detected	0	Non-Fibrous	100
24717-27	114			Drywall Joint Compound	Off White	100	None Detected	0	Non-Fibrous	100
24717-28	116	Mar-25-2015	LR	Floor Tile - Type 2 - 12"x12" Grey Speckled	Grey	100	None Detected	0	Synthetic (0.5%) Non-Fibrous (99.5%)	100
24717-30	108	Mar-25-2015	LR	Baseboard (Black)	Black	100	None Detected	0	Non-Fibrous	100
24717-32	Stairwell	Mar-25-2015	LR	Stair Tread (Grey)	Grey	100	None Detected	0	Non-Fibrous	100
24717-33	Exterior	Mar-25-2015	LR	Window Caulking	Black/Grey	100	None Detected	0	Glass (3%) Non-Fibrous (97%)	100
24717-34	Exterior	Mar-25-2015	LR	Window Caulking	Black/Grey	100	None Detected	0	Non-Fibrous (97%) Glass (3%)	100
24717-35	Exterior	Mar-25-2015	LR	Window Caulking	Black/Grey	100	None Detected	0	Non-Fibrous (97%) Glass (3%)	100
24717-37	Exterior - Roof	Mar-25-2015	LR	Red Asphalt Torch-on (Top Layer Only)	Red/Black	100	None Detected	0	Synthetic (20%) Non-Fibrous (80%)	100

Note: Samples were analyzed by method: EPA/600/R-93/116" Bulk Asbestos Analysis by Polarized Light Microscopy". For heterogenous materials the concentration may vary. No reproduction without permission.

AIHA Proficiency Analytical Testing Programs, LLC

Sample No	Location	Date Analysed	Analyst	Description	Phase	%	Asbestos	%	Other Materials	%
24717-38	Exterior - Roof	Mar-25-2015	LR	Vent Pipe Caulking	Silver/Black	100	None Detected	0	Non-Fibrous	100
24717-40	211 - Boardroom	Mar-25-2015	LR	Cork Material	Brown/Black	100	None Detected	0	Non-Fibrous	100

Note: Samples were analyzed by method: EPA/600/R-93/116" Bulk Asbestos Analysis by Polarized Light Microscopy". For heterogenous materials the concentration may vary. No reproduction without permission.

AIHA Proficiency Analytical Testing Programs, LLC

APPENDIX 3: EVALUATION OF ASBESTOS CONTAINING MATERIALS (ACM)

Assessment of Condition

Spray Applied Fireproofing, Insulation and Texture Finishes

In evaluating the condition of ACM spray applied as fireproofing, thermal insulation or texture, decorative or acoustic finishes, the following criteria apply;

GOOD	Surface of material shows no significant signs of damage, deterioration or delamination. Up to one percent visible damage to surface is allowed within range of GOOD. Evaluation of sprayed fireproofing requires the surveyor to be familiar with the irregular surface texture typical of sprayed asbestos products. GOOD condition includes unencapsulated or unpainted fireproofing or texture finishes, where no delamination or damage is observed, and encapsulated fireproofing or texture finishes where the encapsulation has been applied after the damage or fallout occurred.
POOR	Sprayed materials show signs of damage, delamination or deterioration. More than one percent damage to surface of ACM spray.

Mechanical Insulation

In evaluating the condition of mechanical insulation (on boilers, breeching, ductwork, piping, tanks, equipment etc.) the following criteria are used:

GOOD	Insulation is completely covered in jacketing and exhibits no evidence of damage or deterioration. No insulation is exposed. Includes conditions where the jacketing has minor surface damage (i.e., scuffs or stains), but the jacketing is not penetrated.
FAIR	Minor penetration damage to jacketed insulation (cuts, tears, nicks, deterioration or delamination) or undamaged insulation that has never been jacketed. Insulation is exposed but not showing surface disintegration. The extent of missing insulation ranges should be minor to none.
POOR	Original insulation jacket is missing, damaged, deteriorated or delaminated. Insulation is exposed and significant areas have been dislodged. Damage cannot be readily repaired.

Non-Friable and Potentially Friable Materials

Non-friable materials generally have little potential to release airborne fibres, even when damaged by mechanical breakage. However, some non-friable materials, i.e., exterior asbestos Concrete products, may have deteriorated so that the binder no longer effectively contains the asbestos fibres. In such cases of significantly deteriorated non-friable material, the material will be treated as a friable product.

APPENDIX 4: CERTIFICATE OF ANALYSIS – SUSPECTED LCP SAMPLES

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 786-5974
http://www.EMSL.com cinnaminsonleadlab@emsl.com

EMSL Order:	201503349
CustomerID:	PAEC50
CustomerPO:	
ProjectID:	

Attn: **Janet Peto**
North West Environmental Group
2950 Douglas Street
Unit 210
Victoria, BC V8T 4N4

Phone:	(250) 384-9695
Fax:	(250) 384-9865
Received:	03/24/15 10:24 AM
Collected:	3/20/2015

Project: **24717 / William Head-Admin Buidling HazMat**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
24717-29	*201503349-0001*	3/20/2015	3/24/2015	<0.010 % wt
	Site: 125/129 Desc: Paint chips on wall			
24717-31	*201503349-0002*	3/20/2015	3/24/2015	0.040 % wt
	Site: 21- Concrete wall Desc: Off-White Paint Chips			
24717-39	*201503349-0003*	3/20/2015	3/24/2015	<0.010 % wt
	Site: Exterior Desc: Brown Paint off Soffit			

Julie Smith - Laboratory Director
NJ-NELAP Accredited:03036
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, AIHA-LAP, LLC ELLAP 100194, A2LA 2845.01

Initial report from 03/25/2015 10:39:54